RAILROAD GAZETTE

FRIDAY, SEPT 6.

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Contributions.

Componential Trusses for a Traveling Crane.

PHILADELPHIA, Pa., Sept. 2, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The general view of the "Componential trusses," published in your issue of Aug. 23, is a great improvement upon the original photograph sent you.

I regret that the name of Wilson Brothers & Co. did not appear in connection with the article, since it was in the development of their work that I made the design.

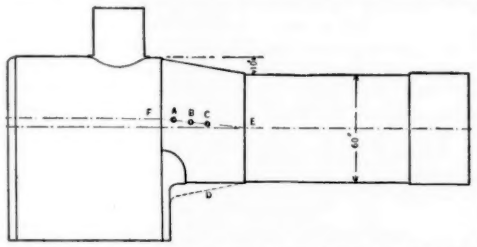
Messrs. Cofrode & Saylor, contractors, should also be mentioned, as the work was unusually difficult to assemble, and was very well executed. HENRY B. SEAMAN.

Cross Stays in Boilers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

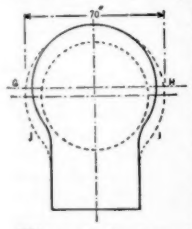
U. R. S., in your issue of July 26, asks for information regarding the use of cross stays in locomotive boilers.

The reason cross stays are used at the points *A B C* in the conical or tapered connection between the cylinder portion



and outer fire-box is to keep the boiler from bulging when the vertical sections through these points are not truly circular, which is frequently the case. It may be remarked here that no wagon-top boiler with a straight bottom sheet at *D* can have a truly circular section, taken vertically, anywhere between *E* and *F*, for the reason that the centre line is inclined to meet the centre of wagon top. It is therefore circular only at sections taken at right angles to the axis of the cone; provided also the width at *G H* is not less than the diameter of the cylindrical part, plus the laps of sheets and the rise of the wagon top. If the width is less than this, the sections will evidently be oval, and the use of cross stays necessary, to resist the effort of the internal steam pressure to make the sheets assume a circular form, and thereby to equalize the pressure at all points.

In a boiler with a tapered bottom sheet, as shown dotted,



and a straight, horizontal centre line for the cylinder, tapered cone and wagon top, the end view would be as shown in dotted line *I J*, and the minimum width would equal the diameter of the cylindrical part, plus the laps and twice the rise of wagon top. In this case, the use of cross-stays would be superfluous, as all parts in vertical section would be truly circular.

Where a boiler has a long, tapered connection between *E* and *F*, with only a moderate rise of wagon top, a circular back end and a straight bottom sheet at *D*, it would seem that the cross stays could be omitted without weakening the boiler to any appreciable extent. C.

[It is customary in making wagon-top boilers of the locomotive type to make the diameter of the back head equal to the sum of the diameter of the shell, the thickness of the sheets and the rise of the top. When this is done and the back head is a true circle the vertical sections through the taper gusset are truly circular, and are not circular if taken at right angles to the centre line of the cone *F E*, as C states. And it may be further stated that if the sections at right angles to the centre line of the cone were truly circular, then the shell of the boiler and the wagon top must be oval in section in order to join the cone of the gusset. Therefore U. R. S. is right in the premise stated in his query. C states that cross stays are unnecessary where the cone is of small taper, but that is hardly an answer to U. R. S., who desires to know if stays are needed for the particular dimensions given in his sketch.—EDITOR RAILROAD GAZETTE.]

Brakes on Engine Trucks and Twelve-Wheeled Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I wish to express approval of the article in the *Railroad Gazette* of Aug. 30, on "Some Elements of Efficient Braking," and particularly so with regard to the suggestion you make that the State Railroad Commissioners who investigate accidents should inquire into the actual and possible braking power of those trains that come to grief from not stopping quickly enough. The suggestion is most timely. The Commissioners could not do the public a greater service, for although we claim to lead the world in the efficiency of our brake equipment, and rarely hear of failure, yet as you say "we know it is due partly to luck and partly to incomplete reporting that accidents from insufficient brake power are seldom recorded here."

The instance you give of a vestibuled train which got an unexpected signal to stop, and ran 2,000 feet on a level before it could be stopped, is a most pertinent illustration, and would form an excellent basis for the Commissioners' inquiry. Such a case occurring in Great Britain would, as you indicate, have been seized upon by the Board of Trade and subjected to strict inquiry, the results of which could not fail to be of benefit to the public at large.

It is in such cases of emergency that the weakness of our brake system is developed, and to allow such failures to pass without inquiry is to foster an inefficient system and to cultivate an indifference which leads to cruel and shocking disaster. Why should "luck" be any longer tolerated in matters so serious? Why are the causes of such failures suppressed? Why this effort to close up all avenues of information? Surely the system in which we "lead the world" is strong enough to bear criticism; or are we to conclude that failures are inherent and beyond remedy, and must be shrouded in darkness lest they become alarming? Let the Commissioners insist that they be brought to light; that the defects, if any, may be known, and we can safely trust that ability and genius which has already achieved so much to find a remedy.

It is said to be the hardest thing in the world to make a man think, and there is nothing like a concentration of public opinion to make him do it, therefore let the Commissioners seize upon each case as it occurs, and the more drastic their measures the more speedily will the remedy come.

Your statement also of the fundamental principles of all brake work, viz., that there should be a brake shoe upon every wheel, is worthy of all commendation; but it would have been better without the limitation, "except, perhaps, upon the engine truck." As I have before pointed out, this is an easy statement to make, but it is not so easy to give a reason for it.

Last November, when I had the pleasure of introducing this subject to the New York Railroad Club, there were no valid objections made to it, and since that time opinion has grown in its favor, so that at the last Master Mechanics' Convention at Niagara Falls, I heard it stated by one of the members in open meeting, during the discussion on driver brakes, that he was in favor of a brake upon every wheel, including the engine truck, and it was received without controversy. Why should it not be? The engine truck usually carries about one-third of the weight of the engine, and no possible harm can come from a properly constructed brake upon every wheel of it. If engines can take what I presume are the shortest curves in the world, as they do daily upon the New York Elevated with a brake upon the engine truck and continue to do so daily without accident, why should not surface roads adopt them? It is perfectly practicable, no reasonable objection can be made to it, and this additional ten tons of brake power thus obtained would be of incalculable service to the company and to the public.

There is also no reason why a six-wheel car truck should not have a brake upon every wheel. If you will refer to fig. 5 in the New York Railroad Club report for November last, page 4, you will find that I gave an illustration of one of the best systems that was ever designed for a car brake, and the diagram shows it on a six-wheel truck. Certainly the company that first adopts these additional holds for brake-shoes in a test for brake power will "lead the world."

JAS HOWARD.

[In the matter of accidents from insufficient braking power, we do not think that there is any "effort to close up all avenues of information." It is simply that no railroad company, any more than any other business concern, is going to lay bare its weaknesses voluntarily. The brake companies themselves would like publicity, for it is to their interest that the brake rigging should be the best, and rolling stock equipped in the most complete and thorough manner. They would welcome investigation. If, however, a railroad company is slow to equip with an efficient brake rigging, or is contented if but 57 per cent. of the weight of its trains is braked, it is simply doing as all of its competitors are doing, and can certainly not be expected to tell facts that will bother its general passenger agent. We need not look for a conspiracy of silence because the facts are hard to get. Other matters suggested by Mr. Howard are discussed in the editorial columns.—EDITOR RAILROAD GAZETTE.]

Strength of Beams and Columns.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Please grant me space to reply to your review of my "Strength of Beams and Columns," which I find in your issue of July 26.

I note that you say, "If a theory containing a mechanical absurdity leads to rational results, it does not prove that fallacy is truth, but rather that some error must be involved to offset the first error." That this theory does lead to *rational results* the facts amply sustain, and that it does not contain a mechanical absurdity is equally true.

The eighth principle you claim contains a "mechanical absurdity." In substance, you say let *A B* be a beam supported at both ends and loaded at the middle with a load *P*. Now let one-half, *A*, be removed and apply the forces *p* and *q* in order to maintain the *same equilibrium* that existed in the beam originally.

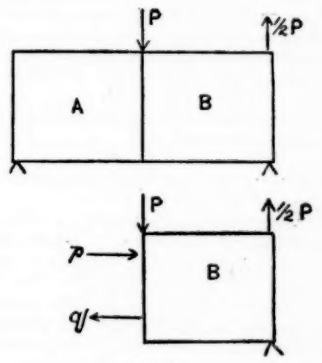


Fig. 1.

And since the applied forces, after equilibrium is established, are not to move the beam, we have a clear case of statics, according to which the sum of the forces parallel to one axis is zero; also, those parallel to a perpendicular axis must be zero. According to the usual notation, let one axis be x and the other y, then we have

$$\Sigma x = 0, \text{ and } \Sigma y = 0.$$

We need consider only the x forces, or those parallel to the axis of the beam. *These must be zero.* "Any theory formed on a contrary supposition contains a fallacy." Now, in the application of the theory you advocate to the class of T-beams, Hodgkinson beams and railroad rails, p is never equal to q, or the algebraic sum of the horizontal forces is not zero, which shows that this mechanical absurdity that you complain of exists in your theory also.

If the equilibrium in your half beam *B* is *identical* with that that exists in the whole beam, your criticism is correct, if not, you are in error. If they are identical, they must maintain the *balanced* condition in *identically* the same manner, or we will have an entirely different condition from that that exists in the beam *A B;* the equilibrium in your half beam *B* is maintained by the moment of the force ½ *P* resulting from its tendency to revolve downward around the point of support as a centre of motion. This moment is balanced by the moment of your stress couple *p q*, from its tendency to revolve horizontally around a point half way between their lines of action as a centre of motion. We thus have in this system of forces two distinct centres of motion, and these same centres must exist in the *whole* beam *A B* in order that the conditions of equilibrium shall be identical.

The single applied force *P* bends the beam and thus developes the horizontal forces. Static equilibrium is only established after all motion has ceased. In such a system of forces the developed forces originate as the result of transverse motion, and must have one common centre, which is necessarily the centre of resistance, and not two centres as we have in our half beam *B*. Hence the conditions are not identical, and the principle does not apply to the equilibrium of the half *B* when it is in the beam *A B*. Now, if the couple *p q* existed in the half beam *B* it could have no moment or leverage. To illustrate this complete the diagram of forces as given below:

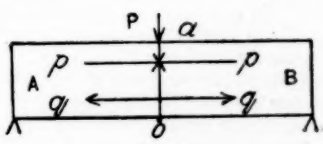


Fig. 2.

Each point in the line *a b* is horizontally a fixed point by the very conditions of the problem and must be so in order that the horizontal forces shall exist—it being made up of the change or reverse points in their lines of direction. As your couple *p q* can only have leverage by reason of a tendency to horizontal motion, and this tendency it cannot have since each point in the line *a b* is a fixed point horizontally, therefore you will have no moment to balance the moment of the load ½ *P*. Moreover, when a beam is broken, the horizontal forces *q q* pull the fibres directly asunder, and in this it does not differ in its mechanical effects from that observed when a rope or tie is pulled apart by two like forces, and can have no more leverage by reason of horizontal mo-

tion in the former case than it has in the latter. It is a principle of mechanics that when two forces such as q q directly balance each other along the same line of action, they can have no leverage with respect to any point as a result of a tendency to horizontal motion, for each force is fully occupied in opposing and balancing the other. And a theory based on the supposition that each of such forces q q can at the same time balance each other and form a force of a pair of stress couples p q and p q contains a "mechanical absurdity." The same is true of the horizontal compression forces.

But if we conceive, as is really the case, the horizontal forces p and q in each half of the beam A and B to be developed in mutually resisting the transverse motion of the other half of the beam around the fixed centre of motion a, then the horizontal forces will possess leverage proportional to their distances from the centre of motion a. The above, I think, relieves the theory proposed by me of its apparent "mechanical absurdity," and places it where it really exists, in the common theory. Although you say the moment of compression is not equal to the moment of tensile resistance, still either principle is used in deducing the moment of resistance in the common theory. Prof. Wood says, on page 153–4 of his "Resistance of Materials," the moment of resistance to compression for rectangles is

$$\tfrac{1}{12} R b d^2,$$

"and as the moment of tensile resistance is the same, the total moment of resistance is

$$\tfrac{1}{6} R b d^2,$$

or twice *either moment of resistance*, which assumes that they are equal."

The horizontal compression forces p p, being directly and completely balanced, can have no influence over or relation with the other parallel tensile forces q q except through their moments with respect to the point a. The beam appears to rupture without preference either from extension or compression, and the assumption that each resistance sustains one-half of the load is well sustained by practice, which can only be the case when their moments are equal.

R. H. COUSINS.

[In stating that "in T beams, and certain other forms, the p forces are never equal to the q forces," Mr. Cousins makes a bare assertion without proof. He gives no reason for the non-equality. He does not show how the principal of statics can be satisfied.

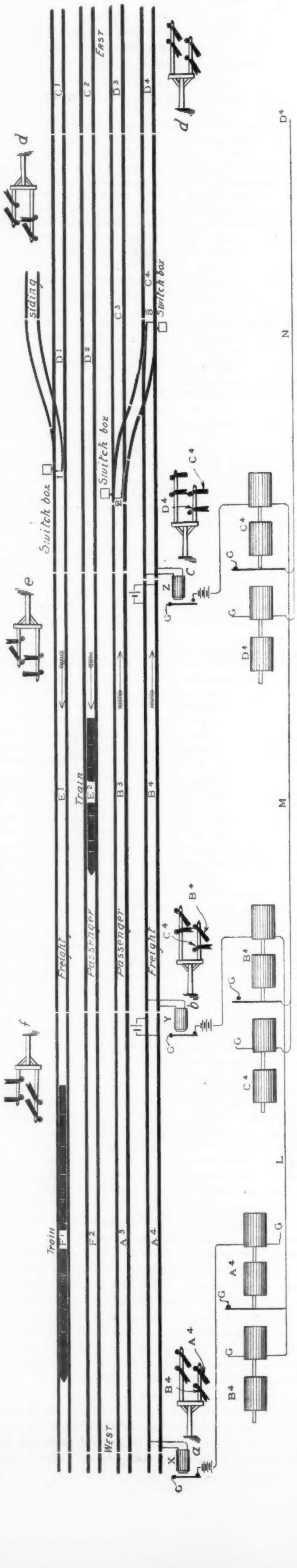
We fail to see the force of the argument whereby it is attempted to prove that the condition of each half of the beam in our illustration is not under the same condition as before the ideal division. This mode of proceedure is so well understood in the treatment of stresses that it seems unnecessary to refer to it, unless we have made an error in its application. We will, however, refer to what appears to us to be an error in Mr. Cousins' argument. It is not true, statically speaking, that a single force P produces the bending. Three forces are involved, $\frac{1}{2}$-P at each end and P at the middle. It is not true that "in this system of forces there are two distinct centres of motion." A single couple, wherever applied, tends to turn the body about the centre of its mass. The couple p q tends to do this. The downward force P acted against by the upward shear $\frac{1}{2}$-P at the same place, leaves $\frac{1}{2}$-P acting downward, and this combined with $\frac{1}{2}$-P acting upward at the support, makes an equal couple, tending to turn the half beam in an opposite direction about the centre of mass, which is the same centre before referred to, and establishes equilibrium. Equilibrium being established, the tendency to turn about *any* point within or without the beam is zero, and the origin of moments may be taken anywhere.

What Mr. Cousins says in regard to two equal opposite concurring forces having no resultant moment is true; but the argument to show that there can be no moment in the section on account of this principle is fatal to his own theory, since, according to it, there will be no internal moment to balance external forces. Also, if the forces q q, fig. 2, "are fully occupied in opposing and *balancing* each other," they cannot "pull the fibres directly asunder." It should be observed that, in our illustration, we did not oppose q to q, but that one q acted upon part B and the other on part A *after* the ideal severance.

The equality of the moments of resistance, referred to in Professor Wood's "Resistance of Materials," is true for beams of rectangular section, and of other beams in which the half above the neutral axis is of the same form and symmetrical with the half below, and we are not aware that he uses this principle in any other cases. This principle cannot be quoted in support of Mr. Cousins' theory, since in Professor Wood's case the origin of moments is on the neutral axis, and in Mr. Cousins' the moments are made equal with the origin of moment on the outer concave surface.—EDITOR RAILROAD GAZETTE.]

Electric Apparatus for Automatic Block Signals.

As a matter of interest to those who have read the account published in the *Railroad Gazette*, of Aug. 23, of automatic block signals on the Pennsylvania, we print herewith a plan showing the arrangement of the batteries, electro-magnets and wires used in operating these signals. The diagram shows three sections of four-track road, and the signals are arranged in the natural order as related to the tracks. That is, taking post f for example, and looking in the direction the train is moving, the two right-hand arms are for track F 1, and stand at danger to protect the train on the section. The left-hand arms are for track F 2, and show all clear, the section being unoccupied. The normal position of arms is horizontal—danger—as on any failure of battery or other apparatus they automatically assume that position; but their *usual* position is down—safety—as at all times when the track is clear the power which works the arms is in operation to hold them down. The cross-over from track 3 to track 4 in section C is shown in position to lead trains from the passenger to the freight track; this, it will be observed, breaks the circuits in both main tracks and throws to danger all the arms on post c, as well as the distant signals for the same section, which are on post b. The method of connecting the circuit breaker, located in the switch-box, was illustrated in the *Railroad Gazette* of June 24, 1887.



ARRANGEMENT OF ELECTRIC CIRCUITS FOR THE UNION SWITCH & SIGNAL CO.'S PNEUMATIC AUTOMATIC BLOCK SIGNALS.

The arrangement of the electric circuits can best be understood by following out the connections for a single section, say B^4. At the east end of this section is the battery, of which one pole is connected to each rail. The track being unoccupied, the current flows through the rails to relay Y, closing it. This closes the circuit through the local battery, and causes the electro-magnet in the pneumatic signal cylinder B^4 to actuate the air valve therein and pull down the arm B^4 on post b. It will be understood that the cylinders A^4, B^4, C^4, D^4, shown in the engraving on an enlarged scale, are located upon the post with their respective arms.

In the diagram the pneumatic cylinders and the semaphore arms are lettered and numbered to correspond with the track section to which they belong. The circuit through pneumatic cylinder B^4 is carried by a line wire L on poles to the distant signal for the same section, located on post a, and the current operates to pull down that signal also. All the circuits through the pneumatic cylinders terminate in the ground (G). If, now, a train enters section A^4 from the west it opens relay X, and, through cylinder A^4, throws to danger the home semaphore A^4 on post a. Strictly speaking, this need not be allowed to affect arm B^4 on post a, as that arm gives an indication for section B^4 and not for section A^4; but to simplify the indications for the engineer and to obviate even an appearance of inconsistency, the opening of the circuit through cylinder A^4 is made to open that through the cylinder shown to the left of it, which actuates distant signal B^4 on post a just referred to. This opening is accomplished by a circuit breaker at the left-hand end of cylinder A^4, by which the current from wire L is turned to the ground before it reaches cylinder B^4. Thus a train on a section always keeps horizontal both of the arms that are immediately behind it. Of the two arms on any one post, an engineer may find the home arm down and the distant arm up, as is shown on post e for track 1; but he will never find the home arm up and the distant arm down, although such a combination would involve no danger if the indication of the home arm was obeyed.

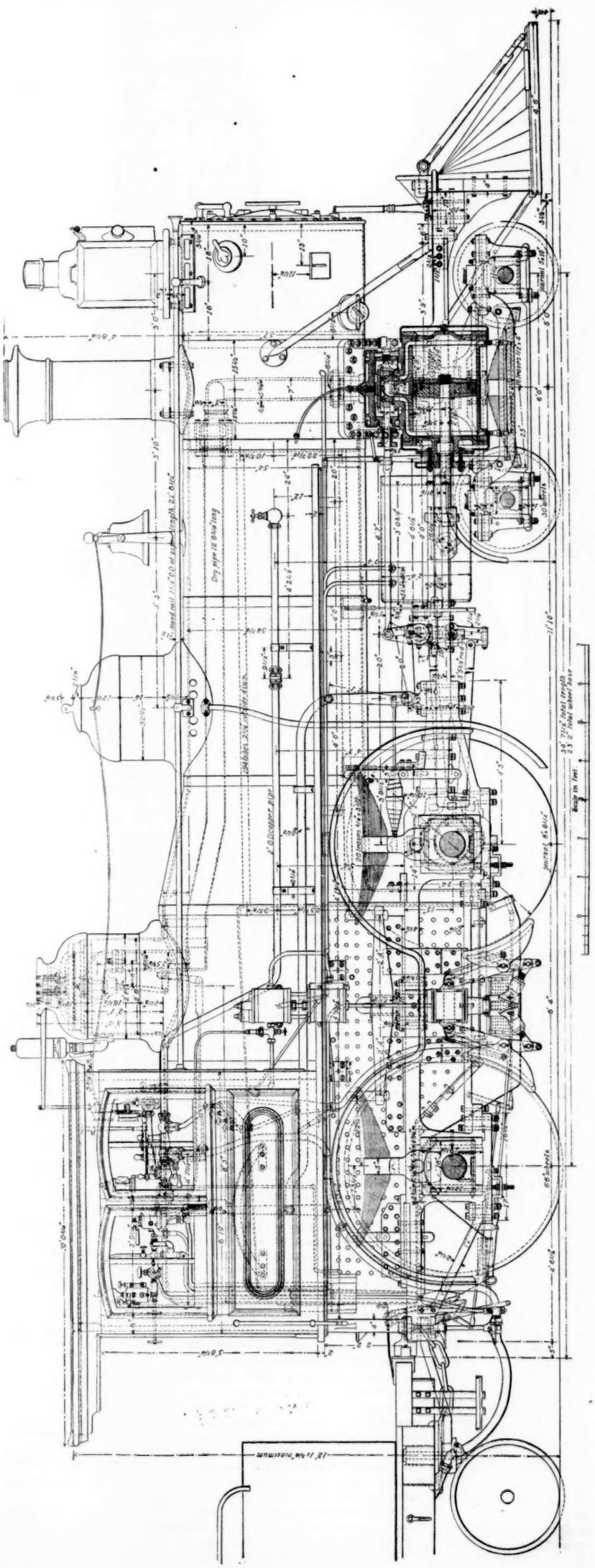
An English Railroad Warehouse.

One may read the descriptions of large English railroad warehouses a long while before he will obtain even a moderate appreciation of their dimensions. No railroad man should visit England without spending a few hours in several of them. One of the largest is at the Midland Railway Station in London. A permit to visit it is easily obtained by applying at the offices in the adjacent station.

The visitor will enter a long drive way, lined on one side with a high brick wall, from which the roof is supported by columns of brick forming arches with the roof. These arches are nearly closed by beautiful wrought-iron work which forms a fence on top of the main wall. On the left is a series of storage rooms which are rented to private companies. These storage rooms are directly connected with the tracks of the sub-cellar of the warehouse, and the freight is delivered from the cars directly to the short platforms connected with the storage rooms. When one enters the vast sub-cellar it seems, in the rather dim light, almost endless. It is traversed longitudinally by lines of tracks which connect with the cross tracks reaching to the storage rooms by means of turn-tables.

Each set of storage rooms has its turn-table and two hydraulic capstans. The cars from the main tracks above are owered into the sub-cellars by hydraulic elevators; they are then passed on to a transfer table, which travels crosswise of the main tracks. In this way cars are delivered from the main tracks above to any desired storage room in the sub-cellar below. A peculiarity of the transfer table is worthy of notice. Its tracks are on a level with the tracks of the sub-cellar; there is no pit, and the floor is of a uniform level throughout. The table is mounted upon small wheels, which travel upon lateral rails. The only evidence of the presence of a transfer arrangement on the floor of the sub-cellar is the line of lateral rails with an opening in the longitudinal rails to allow the wheel of the transfer table to cross over. The rails on the transfer table are about 4 in. above the longitudinal rails and the cars are run up on to the table by wrought-iron inclined planes attached to each end of each rail and furnished with springs to raise them above the floor about 2 in. when not in use.

The operation of shifting a car is simple and interesting; only one operator is required. He seizes one of the many convenient hawsers and attaches it to the car; the other end is then wound several times around one of the numerous and conveniently placed hydraulic capstans. He then presses his



20-IN. × 24-IN. PASSENGER ENGINE, CLASS M, BALTIMORE & OHIO RAILROAD.

F. J. COLE, *Chief Draftsman.*

A. J. CROMWELL, *Superintendent of Motive Power.*

foot upon a large button which projects through the cast-iron corrugated floor around the capstan, and takes in the slack rope as fed by the capstan as the car advances. The car is thus placed upon the transfer table. To remove the car laterally a capstan is arranged at one end of the line of travel of the transfer table and around this a hawser is passed and the table moved laterally in the same manner as described above in the case of the car. In order that the operator may stop the transfer table exactly at a desired point, there is arranged at a proper position in the line of travel of the transfer table, a series of stops which can be adjusted vertically by the operator before the transfer table is moved, and in such manner as to stop the car at any desired point exactly opposite the track upon which it is desired to put the car. In this way, by means of a number of hydraulic capstans and a few hydraulic elevators, cars can be moved very quickly from any one of the floors of the warehouse to any other floor and to any track. Of course the facility of these movements is much increased by the fact that these cars, even when fully loaded, are comparatively light. To handle the heavy American cars would require much heavier apparatus. A similar system, but not as complete in detail or as compact in location, was described with illustrations in the *Railroad Gazette*, April 21, 1882, pp. 233.

Passenger Locomotive, Baltimore & Ohio Railroad.

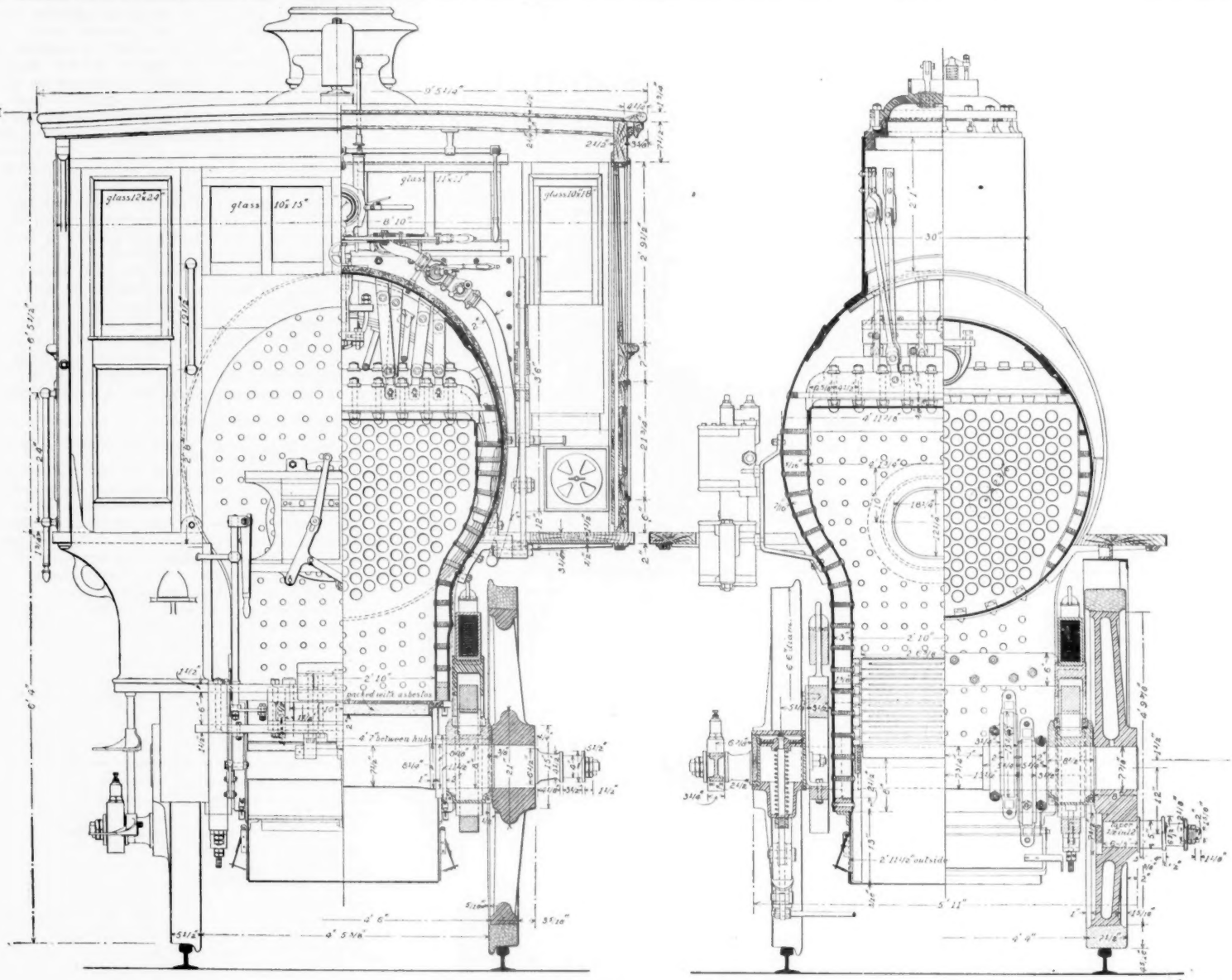
The eight-wheeled express locomotive illustrated herewith was designed for the Baltimore & Ohio in its Mechanical Department. It has several novelties and one or two departures from regular practice which are not often seen. Among the interesting details is the joint between the front rail of the frame and the rear portion. It is very well arranged and furnishes an attachment much superior to some of the more common forms. The peculiar flanged bushing on the reverse shaft bearing is made so as to render it possible to take up the end play of the shaft as well as the wear of the bearings without the use of washers. A renewal of the bushing takes up the wear in both directions at the same time. The link and reverse shaft are not of the most modern design; there is only a small bearing for the pin on the upper arm of the reverse shaft; it is customary now to place a hub on the arm at this point. The links are none too large for the 18-in. valves they are to drive. They are of the same dimensions as formerly used on the light eastern locomotives of the Mason type, having 14-in. or 15-in. ports. It is to be noticed that the bearing to the top of the link hanger is in the hanger itself, and not in the reserve shaft arm. This arrangement causes a bending moment on the pin and removes the point of support to one side of the centre of gravity of the load. Complaints of this arrangement have been made that the wear was unequally distributed over the surface of the pin.

The steam passages in the cylinder are as large as the common type of 20-in. cylinder locomotive, but the exhaust passages are smaller than usual. Just what the effect of this would be on the back pressure it is difficult to state, because the exhaust nozzle is really the smallest aperture through which the steam has to escape. After a consideration of the details of this gear and arrangement of passages a set of indicator cards from this locomotive would be very interesting, and perhaps settle to some extent the dispute regarding the necessity for large exhaust passages and dry pipes.

Among the other details of this locomotive which are noticeably advantageous, peculiar or unusual may be mentioned the following: Crank pin attachment to driving wheels, width of bearing face of eccentrics for 18-in. valves, long truck axle journals and the method of oiling them, small guides 2 in. × 3 in. at centre for 20-in. × 24-in. cylinders, crank pin collar attachment, fire-door arrangement for opening, cab handles, the distance of the centre of the cylinder below the top of the frame at the front end, the attachment of the piston to the piston rod, the neat and novel form of wheel guards, general location of cab fittings and large driving springs with wide spread and 20 leaves. In the general specifications which follow a few novelties appear, such as: Countersinking of rivet holes, a most admirable practice; the use of 4 stays to each crown-bar, cast-iron cross-heads, taper tires on tapered driving wheel centres, brass driving boxes, a large list of extra parts and tools, much-needed directions regarding the finish of exposed castings and wrought-iron work, and a paragraph under the head of "Remarks," which states more clearly and concisely than usual the relations which must exist between the contractor and purchaser of the locomotives. A specification for the material accompanies this general specification similar to the one recently published in these columns in connection with an illustration of a consolidation locomotive for the same company.

Our readers will notice that this locomotive has a rigid centre engine truck and blank tires upon the front driving wheels; this arrangement is in much favor on some very crooked lines, and we are told that under such conditions as exist on railroads having many sharp curves it is more satisfactory, and less flange wear results from it than from the use of swing-motion trucks and flanges on both pairs of driving wheels.

In general this locomotive is a most powerful one for this class, having 73,400 lbs. on 4 drivers, 150 lbs. boiler pressure, 66-in. driving wheels, and 20 × 24-in. cylinders. The maximum moment of rotation of the wheels produced by the two cylinders is not far from 790,000 foot-lbs. The maximum resistance to turning resulting from the adhesion of the drivers to the rails—allowing 600 lbs. per ton of load as the amount of friction resulting from each ton of load—is about 730,000 foot-lbs. Thus it will be seen that when steam is turned on full pressure the piston will have suf-



Half Back View. *Half Section through Back Wheel, looking forward.* *Half Section between Drivers, looking back.* *Half Section through Front Wheel, looking back.*

CROSS SECTIONS BALTIMORE & OHIO PASSENGER LOCOMOTIVE, CLASS M.

ficient power to slip the drivers, when the cranks are in the position of maximum moment of rotation, under all conditions of rail unless it be when the rails are well sanded; the coefficient of friction at that time being an unknown quantity at present, it is impossible to make an estimate of the adhesion. The weight per wheel on the rail in this design of locomotive is very high—*i. e.*, 18,350 lbs. each—and the amount of tire wear per mile of regular service would be worthy of notice and comparison with the lighter locomotives on the same road in similar service.

The following is a general specification of the locomotive shown in the accompanying illustration:

Specification.

Cylinders 20 in. diameter and 24-in. stroke. Driving wheels 66 in. diameter.

Fuel, bituminous coal.

Total wheel base 23 ft. 2 in. Driving wheel base 8 ft. 4 in. Total wheel base of engine and tender 46 ft. 5¼ in.

Total weight in working order, 107,700 lbs.; on drivers, 73,400; truck, 34,300. Total weight of tender, with fuel and water, 68,000 lbs.

Boiler.—Made of best quality steel, including smoke box sheet, cylinder part 7-16 in. thick, throat sheet 9-16 in. thick. Outside diameter of cylinder part of smoke box end 54 in., built straight, or with 8-in. wagon top. Dome 30 in. outside diameter, double riveted to boiler with ¾-in. rivets, and strengthened at base with 1-in. × 4-in. reinforcing ring. Horizontal seams strengthened with ⅝-in. welt strips.

Tubes.—Of wrought iron, lap welded with copper ferrules on firebox ends, No. 12 B. W. gauge, 134 in number 2¼ in. outside diameter and 11 ft. 10 in. long outside of tube sheets.

Fire-box.—Made of best quality steel; dimensions inside, 120 in. long, 34 in. wide at bottom, 49¾ in. wide at crown sheet, 75 in. high in front, 50 in. high at back. Sides and back sheets 5-16 in. thick, crown sheet ⅜ in. thick, tube sheet ½ in. thick. Water space: 3 in. sides, 3 in. back, and 4 in. front. Stay bolts of iron, ⅞ in. diameter, 12 threads per inch, screwed through and riveted to sheets, and spaced not over 4 in. centre to centre.

Crown sheet supported by 21 crown bars made from two pieces ¾ in. × 5 in., and set 1¼ in. above crown sheet with cast-iron washers. Crown bar bolts 1 in. diameter, with button heads next to fire, fitted in reamed holes in sheet. Crown bars to have four sling stays to each bar, connected to shell of boiler and dome.

Guides.—Of steel, 2 × 3 in., 4-bar type.

Valves.—Richardson's balanced, 1 in. outside, 1-32 in. inside lap.

Valve Motion.—Shifting link graduated to cut off equally at all points of stroke, made of best hammered iron, case-hardened and bushed as shown.

Lifting Shaft.—Made with arms welded on.

Rocker.—Of cast iron. Bearing 4½ × 13¾ in.

Engine and tender to be equipped with Westinghouse automatic air brake. Engine to be equipped with Westinghouse driver brake.

Two Macks No. 10 injectors supplied with intermediate check valves, and connected to boiler with 2¼-in. solid drawn copper pipe.

Tender.—To be strongly put together and well braced. Top and sides of 3-16-in. iron, bottom ¼-in. iron, riveted with ½-in. rivets, 1¼ in. pitch. Capacity, 3,500 U. S. gallons. Tender frame substantially built of oak.

Two, four wheeled centre bearing trucks, with 33-in. Boies steel tired wheels each, and to have B. & O. standard flange.

Tender to be furnished with hand and Westinghouse air brakes applied to both trucks.

Axles.—Of best hammered iron M. C. B. standard, journals 3¾ × 7. To be made as per specification.

The Shops of the Paris & Orleans Railroad.

Within the city of Paris, on the Rue De la gare, is located one of the largest railroad shops on the Continent of Europe. It is the principal shop of the Paris & Orleans road. The buildings are not new and the arrangement of the shops is not such as to require special description, but a few notes taken during a recent visit will show some of the interesting features of a French railroad shop.

All castings used in these shops are bought from outside parties; new contracts being made yearly and awarded to the most satisfactory bidder. This system, which has been altogether too severely criticised in the United States, is most satisfactory in the operation of the railroads of France.

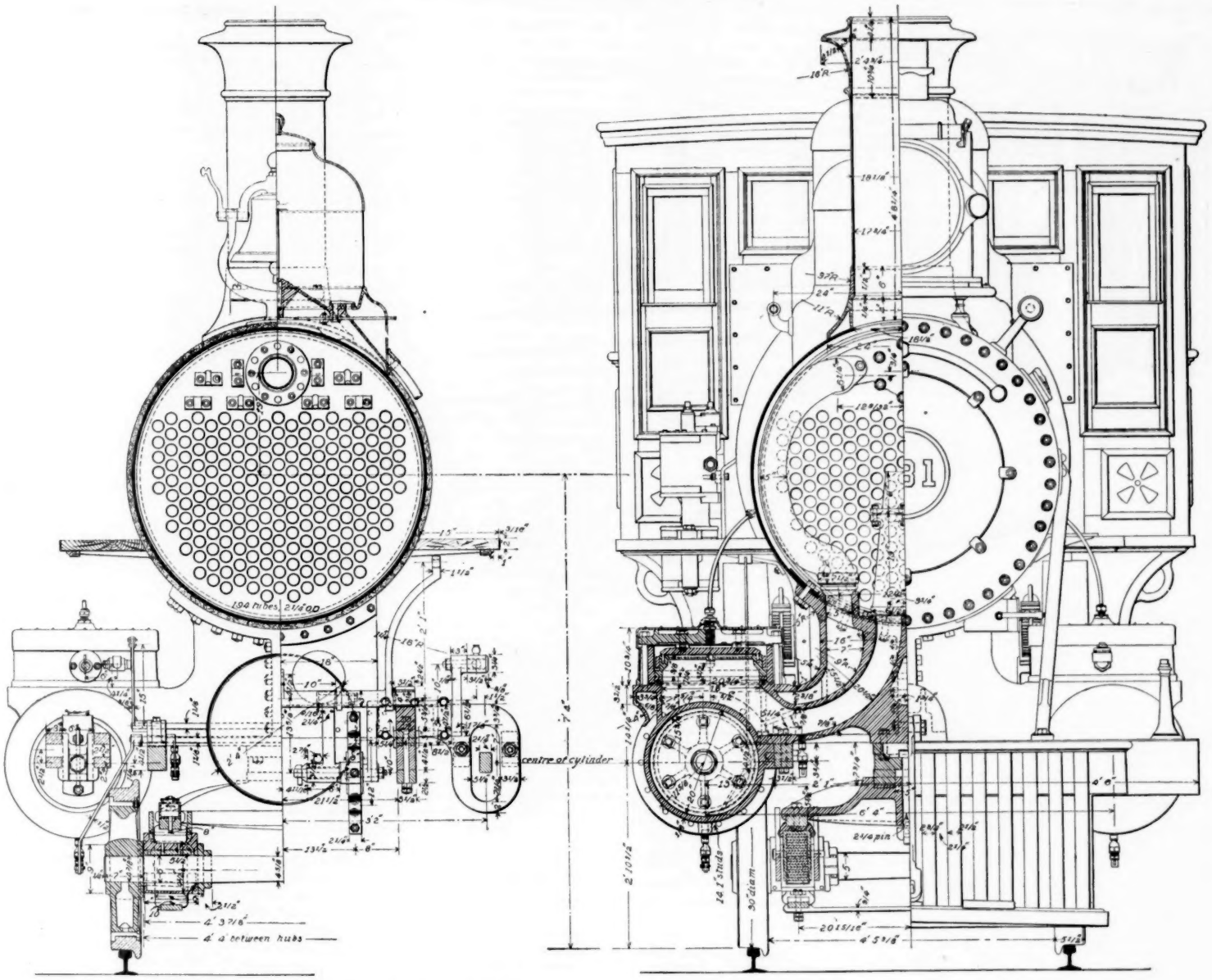
One feature of a Continental railroad shop, which is never seen in the United States, is the tarpaulin department, where the covers are made which are placed over freight in transit in open cars. The tarpaulin is made of a close woven cotton body, covered with a flexible tar covering, the whole being surprisingly thin for the service it has to perform. By standard patterns this material is cut up in large quantities, and sewn into the desired shapes by immense sewing machines. The repairing department is rather a curiosity. One enters a well-lighted room to find several men creeping around on their hands and knees on the tarpaulins spread on the large floor. At first it is difficult to discover what they are about, but light soon dawns when one sees them making chalk marks around what prove by closer inspection to be leaky places in the covering. These coverings, after being thoroughly searched and marked, are passed on to men and boys, seated upon low benches, who darn the leaks. The coverings are next taken to a large table, where the patches receive a coat of elastic tar.

In the machine shops can be seen some very good tools, among which may be mentioned a fine, double-headed drill, suitable for connecting rod work, made by Poulat, Paris; also a large triple headed slotter of peculiar design, made by Graffestaden, Alsace. This slotter is peculiar in having one side of each of the three movable heads fitted up with drills, and by their use the holes in the sides of the frames of locomotives and tenders are drilled before the frames are removed from the slotter, and sometimes while the slotting head is in operation. There is also a large wheel lathe with four tools, two on each side, arranged so that four cutters may be run upon one pair of wheels.

In the spring department is a very convenient spring tester run by a belt from shafting. The head of the press is forced down by two long screws, one on each side of the head, operated by bevel gears. The operation of the tester is very rapid, and each and every spring is thoroughly tested before the band is applied. The springs, which are about 40 in. in length, have on the average three inches camber, and they are bent in the testing machine until the top leaf has a reverse camber of one inch. They are thus bent more than straight, the total movement being about four inches. If under this test they show a permanent set of any appreciable magnitude, they are tested several times thereafter in order to see if the permanent set increases under repeated strains. The only drawing furnished the spring-making department is a design of the spring, with a large tabulation under a glass cover, which carries the dimensions for an immense variety of designs.

In the boiler shop the Twiddell system of hydraulic riveting is employed. A boiler was noticed here with the flanges of the back head turning out into the cab of the locomotive instead of in the reverse direction, as the case is in the recent designs. The wrought smoke-stack tops and bases, flanged to shape of a single piece of steel, are extremely neat and very light. They differed from many others to be seen in having one riveted seam instead of being without seams. The latter plan is one requiring the best material.

In the erecting shops two new transfer engines are building; these engines are not unlike the average yacht engines and resemble considerably those used in America. The transfers themselves are very small, intended only for the light loads which they receive in Continental shop service. The transfer tables have no pits, and the tracks are level with the main tracks in the building. The tracks upon the



Half Section back of Cross Head, looking forward. | *Half Section at Lifting Shaft, looking forward.* | *Section through Cylinder, looking back.* | *Half Front View.*

CROSS SECTIONS BALTIMORE & OHIO PASSENGER LOCOMOTIVE, CLASS M.

transfer table are raised several inches above the floor of the building, the cars being hauled up on inclined planes connected to the table.

Brass jackets on the locomotive boilers are used to a considerable extent. The locomotive exhibited by this company in the Exposition has entire brass trimmings, boiler jackets and all. It is of curious design, and is undoubtedly an expensive engine to build. A companion engine to the one in the Exposition is now building in the shop. These locomotives have four drivers and two front and two rear truck wheels. The trucks are arranged on the "Edmond Roy" system. The cylinders are placed inside of the frames, the steam chests projecting through to the outside. The valve motion, therefore, is entirely outside the frames. The steam pressure is about 200 lbs. per square inch. These locomotives are not compounded, and the economy as compared with compound engines, having the same boiler pressure, will be watched with interest. The boilers are made of iron $\frac{9}{16}$ in. thick. The air-brake tanks are conveniently placed in, what is to American engineers, a new position. They consist of long pipes about 10 in. diameter, and are placed under the running boards. The tubes for all boilers are about $\frac{3}{32}$ in. in thickness and are made of brass, with copper ends brazed on. These copper ends are from 4 to 6 in. long, and are annealed after being brazed. All tubes are tested before being put into the boiler, as they always should be, no matter what the material is of which they are constructed. The apparatus for tube testing is very complete and so convenient that only a few moments are occupied for each tube. It is noticeable that steel castings are used for almost everything requiring great strength for a minimum weight. Here can be seen an ideal driving box for locomotives. It is light and strong and has large wearing surfaces.

There is a curious set of tires here for use on a narrow gauge line running from Paris to Sceaux and Limours. The tires are 12 in. wide and about 2 in. thick. They are flangeless and are intended to enable the locomotive to pass the sharp curves of the line. There are at these shops a pair of wrought-iron driving wheels about 80 in. diameter, which do not weigh as much and are fully as strong as 50 in. cast iron ones used in the United States. Another curiosity in driving wheels here to be seen is one with wrought-iron spokes cast into an immense cast-iron hub. The wrought-iron rim and spokes were inserted in the mould and the cast iron poured around them. This is an obselete form and is not now used.

The side sheets coverin the passenger cars are about $\frac{3}{4}$ in. in. in thickness. They are made of steel and are used principally for the following reasons: They are cheaper than good seasoned hard wood, which will take the same polish; they are easier applied and the paint wears much longer and stands service much better on metal than on a wooden service. In proof of this one has only to examine the cars which are brought in for revarnishing after two years' service. Two years is the customary time to allow the cars to run without a new coat of varnish.

At the Paris Exposition the Paris & Orleans Railroad has a particularly fine exhibit. No portion of it, however, is more interesting than a large passenger car which has four-wheeled trucks, and trusses for the car side quite similar to that known as the "Chandler" and used on the Chicago, Burlington & Quincy. The outside finish of the car consists of one sheet of steel, 63 ft. in length by 3 ft. 4 in. in width, and about $\frac{1}{8}$ in. thick. The side of the car is perfectly plain from end to end, and the paint upon the surface of this sheet forms a beautifully finished surface. The tops of covered freight cars on this line are covered with zinc.

The lamps used in the coaches burn petroleum and are almost wholly outside of the cars, only the glass globe projecting through the roof. The signaling apparatus between the guards and the locomotive engineer on the Paris & Orleans road is, like that on most Continental railroads, operated by electricity, the coupling resembling very much that of the Westinghouse air-brake hose, but much lighter.

The compressed air brake used is that known as the "Wenger." The injector used on the locomotives is one designed by M. Polonceau, Engineer in Chief, who is the well-known author of many valuable papers read before the French Engineering Societies. This injector is said to be far more satisfactory than any previously tried, and is the result of considerable experiment.

One of the novelties in French railroad shops is the system of distributing drinking water. From time to time one sees an old man with a tank strapped upon his back resembling not a little the fire extinguishers used in America. From the bottom of this tank there projects, under the arm of the carrier, a long faucet, upon which is hung a variety of tin cups. This peculiar combination wanders about among the different departments, and treats the boys as required.

Fuel Oil.

Under the title of "Fuel Oil for Stationary Boilers in New York City," Mr. H. F. J. Porter publishes an interesting article in the July issue of *The School of Mines Quarterly*.

Fuel oil is a distillate from the oil refineries, having a specific gravity of 0.818 and flash test of about 218 deg. Fahr., and weighing 5.81 lbs. per gallon. Its composition by weight is as follows:

	Per cent.
Fixed carbon	85.334
Hydrogen	13.525
Oxygen and impurities	1.141

The present price of this oil is $1.47 per barrel of 42 gallons, or

$0.035	per gallon.
$0.005	per pound.

It is burned in the form of spray, being atomized by steam or compressed air, or vaporized by pipes in the furnace. Several illustrations of burners are given in the original paper, but they do not differ in principle from burners which have already been shown in the *Railroad Gazette*, consisting essentially of fittings acting like injectors, the oil being forced into the furnace by the steam or compressed air, mingled with the air required for combustion, valves being connected to regulate the supply of oil, steam and air. When it can conveniently be done flues are built into the furnace and back-connection to heat the air supplied for combustion. Where fuel oil is burned in the furnaces of boilers, insurance companies require certain precautions to be taken, and it is stated that the following rules, adopted by the Associated Factory Mutual Insurance Companies of Boston, cover the most important particulars:

"The tanks should be of iron, placed upon solid foundations, and fitted with tight covers provided with ventilating pipes for the removal of any vapor passing off from the oil.

"The tanks should be situated where they will not constitute an exposure to the buildings in case of fire. It is very desirable that the main tank, at least, if above ground, should be surrounded by a dyke or embankment, inclosing a space

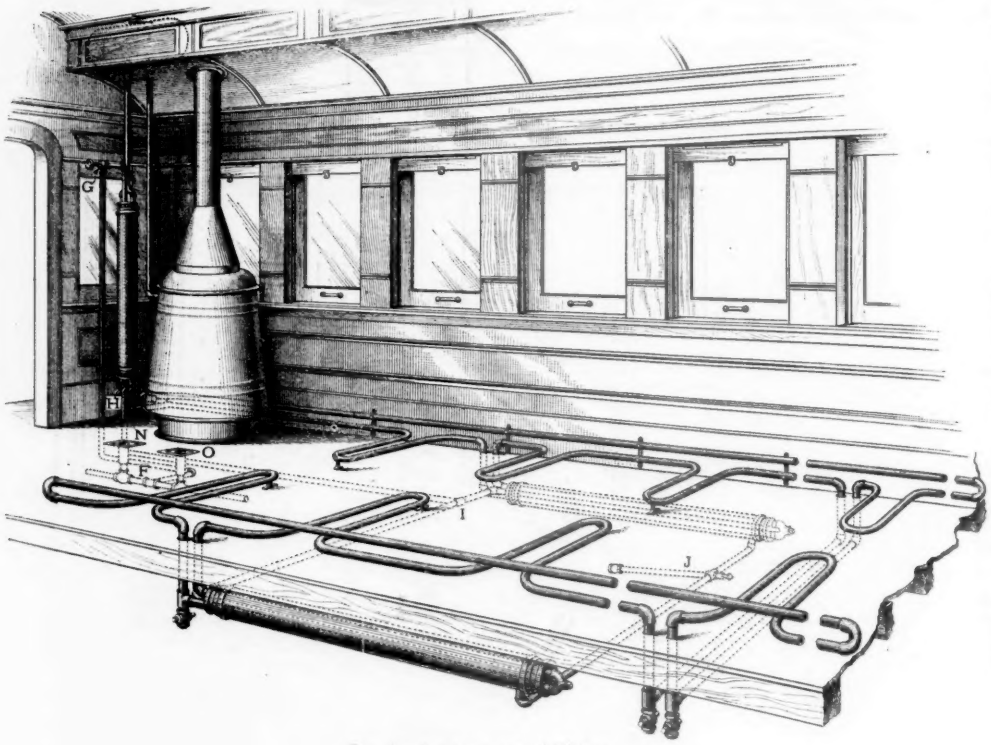


Fig. 1.—Arrangement of Piping.

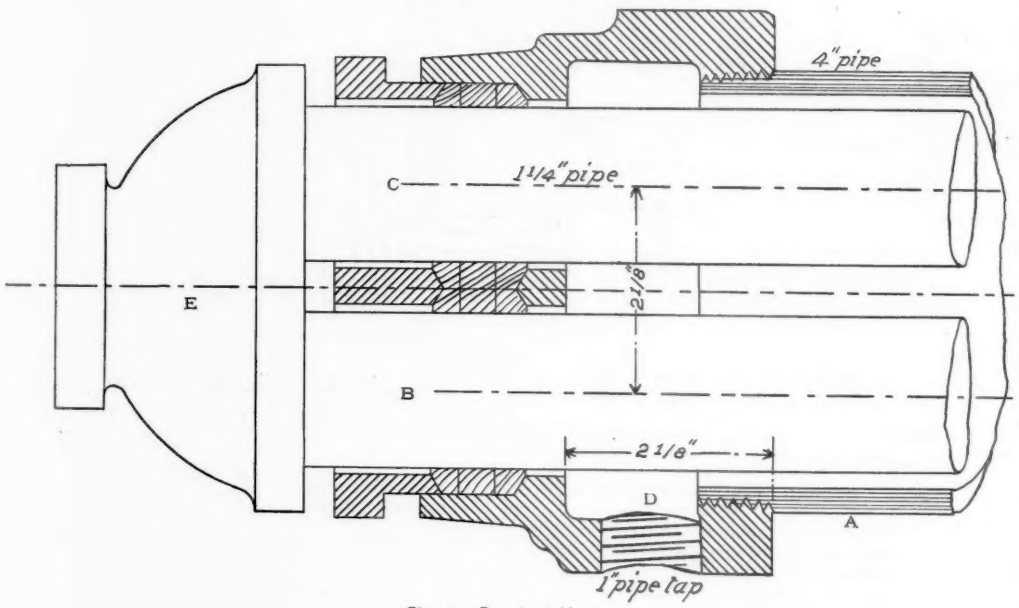


Fig. 2.—Detail of Heater.

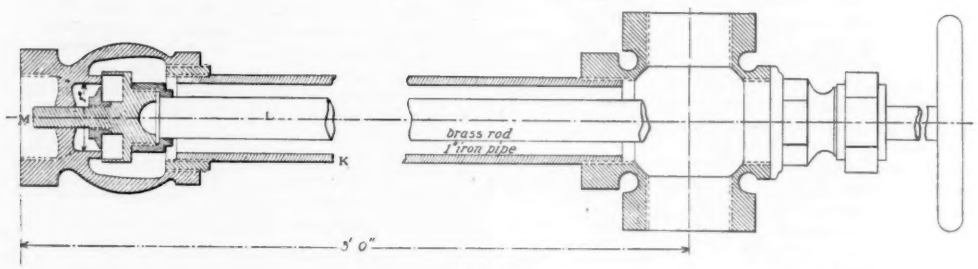


Fig. 3.

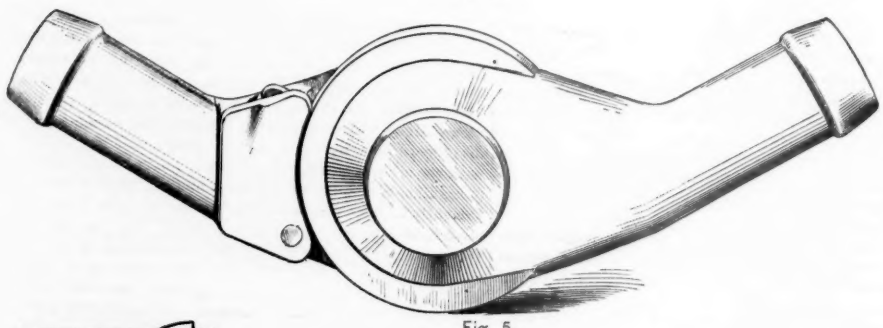


Fig. 5.

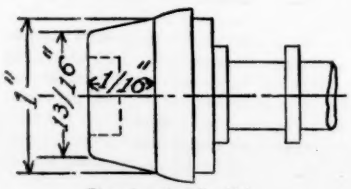


Fig. 4.—Needle Valve.

CONTINUOUS TRAIN HEATING BY HOT WATER CIRCULATION.

SAFETY CAR HEATING AND LIGHTING CO., *New York City.*

sufficiently large to accommodate the whole contents of the tank without overflow.

"There should be two tanks; the main tank being placed where it could receive the supply discharged from the tank-cars by gravity, whence it may be pumped into the smaller distributing tank which feeds the oil directly to the burners.

"An over flow pipe in the distributing tank should be placed so as to discharge any excess of oil back into the reservoir tank.

"Pipes should be placed underground as far as possible; the various connections should be supplied with valves for cutting off the flow of oil when desired.

"If the oil is admitted to the burners before a flame is placed in the furnace, flashes or explosions are almost sure to follow, and it is absolutely necessary for safety that a burning torch or other flame be placed in the furnace before the oil is let on to the burners."

Mr. Porter estimates that the theoretical calorific value of Lackawanna pea coal is 17,890 British thermal units per pound, and that of the fuel oil 20,079; so that a pound of oil = 1.16 lb. coal, or, considering the cost of handling coal and ashes, 1 lb. oil = 1.37 lb. coal.

From this he figures that the fuel oil will be as cheap as coal, only when coal costs $8.17 per ton; the rule for computing being

$$\frac{2{,}240 \times \text{price of oil per barrel}}{\text{Weight of oil per gallon} \times \text{number of gallons per barrel} \times \text{ratio of oil to coal}}$$

= price per ton of coal (including handling and disposal of ashes), which must not be exceeded.

This estimate seems to favor the coal unduly, for the reason that the actual evaporative efficiencies of oil and coal are not in the same ratio as their theoretical efficiencies.

Car Heating by Hot Water Circulation.

The cuts herewith show the main features of the new car heating apparatus of the Safety Car Heating and Lighting Co., 160 Broadway, N. Y. This system is the outcome of many experiments, and differs from that used last season in several particulars, among which may be mentioned the use of two small instead of one large heating drum; a reduction of the total pipe per car; larger heating surface in the circulation "starter;" the use of the Gibbs patent hose coupling and a better arrangement of piping.

The following is a general description of the arrangement of pipes, and of the method of circulation. Fig. 1 shows one end of a car fitted up with all of the devices in position. It will be noticed that the starter beside the Baker heater is quite the same in dimensions and general appearance as the heaters beneath the car. The detail of this is given in fig. 2, in which *A* is a 4-in. steam pipe screwed into cast-iron ends. These ends are fitted with stuffing boxes and glands at *B* and *C*, packed with hemp and rubber packing, through which the water pipes in the circulating system pass. At three places in each cast-iron head there are holes tapped, as at *D*, for one-inch steam pipe, which admits steam from the train pipe. Only one of the three holes is used at a time, the others being plugged. These are provided simply for convenience in fitting. In fig. 1 the pipes are shown entering at the top instead of at the side, but the action is identical in both cases. The two pipes *B* and *C* which are connected with the circulating system are connected together by a header at top and bottom, as shown at *E*, and at the top and bottom of the heaters the pipes of the circulating system connect into these headers. The use of two pipes connected in multiple reduces the velocity of the water in the heater, also the resistance caused by friction, and allows a longer time of contact between the water in the circulating system and the warm pipes of the heater.

The two heaters under the car and the "starter" beside the Baker heater are identical in all parts. Fig. 1 shows the location of the heaters, one being placed on each side underneath the car floor and connected by two lines of straight pipe, one at each end. Steam from the train-pipe *F* proceeds as follows: Up the vertical pipe through the valve *G* to the top of the starter, down through the jacket of the starter around the water pipe and out at the bottom at *H*. Thence along a horizontal pipe, to the pipe connecting the heating drum at *I*, and into the jackets of the heaters.

The condensation passes into the pipe connecting the heating drums at the other end and out at the expansion trap *J*. This trap is clearly shown in fig. 3. It consists of an iron pipe casing *K*, screwed into a brass valve seat at one extremity and into a cross valve at the other. Inside this iron casing is a brass rod *L*, secured at one end and free to move by expansion at the other. On the free end of the rod is secured a Jenkins valve with a guide *M*, to keep the rod in an accurate horizontal position. This guide *M* is a decided

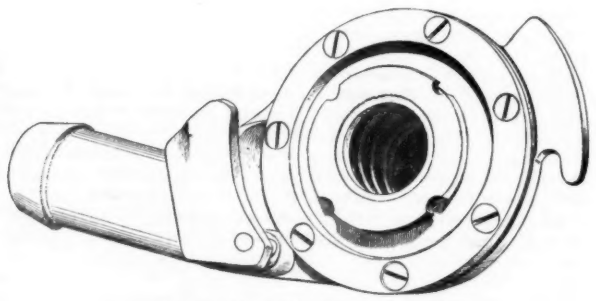


Fig. 6.—Hose Coupling, Unlocked.

improvement over the old method of leaving the rod without support at the free end. The operation of this trap is simple and on the same general plan as other expansion traps of similar design. There is, however, a change for the better in this trap from those formerly used by this company; it is in the admission of steam at the opposite end from the valve seat.

At *N* and *O*, in fig. 1, can be seen the train-pipe valves, which are operated when the car is placed at the end of a train. These valves have convenient connections to be operated from within the car. At *G* is placed the controlling valve, which regulates the temperature of the car. This valve is of the kind known as a "needle" valve. It has a long, tapering plug seat, as shown in fig. 4. This illustration shows the taper plug on the end of the valve spindle.

Fig. 5 shows the new hose coupling as it appears when coupled to its mates. Fig. 6 shows the construction of the face of the coupling, and gives a general idea of its design. It consists of a flexible diaphragm of phosphor bronze secured to a curved disc by an annular ring of brass. Upon this diaphragm is mounted the packing ring of vulcabeston, which forms the joint. The packing ring is screwed on to the diaphragm by the semi-circular notches shown. In the interior of the coupling, fig. 6, can be seen a small nickel-plated spring which forces the joint together when the steam pressure is not turned on. The motions necessary to make a coupling are the same as those required for the Westinghouse air-brake hose coupling, and, if a train parts, these couplings will unlock and separate without injury to themselves or other parts.

The reader will notice that the direction of circulation in this system is opposite to that in the Baker heater system; this simplifies the construction and, as shown by experiment, leads to no new difficulties. In operation a circulation of heated water has been obtained in 18 minutes, while the Baker heater on the same system of pipes required about two hours. It will be noticed that the heating drums are so placed as to divide the water circulating pipes into three sections between heaters. This subdivision causes the circulation to be heated at three different points of its length, and by this means the temperature of the pipes is maintained at nearly a uniform height throughout all parts of the car. In applying this system of steam heating to the Baker system the independent operation of that system is not impeded.

Band Saws for Metal.

BY LEWIS F. LYNE.

Several months ago I recommended a band sawing machine to a friend of mine for cutting the gates off brass and bronze castings in a foundry. This machine, made by the Pratt & Whitney Co., is in principle an ordinary band sawing machine, consisting of a G-shaped *frame* with table 27 in. square. This table stands 39 in. from the floor, and has a gauge which may be set at all angles, and is moved 8 in. by means of a screw and hand wheel. The screw, with wheel, may be readily detached so that the slide can be moved by hand in cutting light sheet metal. In cutting gates this gauge is removed, and the slide is not used at all. The wheels that carry the band saw are 28 in. in diameter, with straight, smooth faces, upon which the saw lies without injury to the teeth therefore the rubber covering which is always put upon the wheels of machines used for wood saws is not needed in this case. The lower or driving wheel is connected by means of a gear wheel having 50 teeth upon the end of its shaft meshing into a pinion having 20 teeth. A cone having four steps is attached to the pinion shaft, so the revolutions of the cone are two and one-half to one of the 28-in. wheel, which gives the requisite power to drive the saw.

I run the countershaft 195 revolutions per minute with the belt on the 11-in. step, next to the slowest speed for cutting bronze, the steps being 7 in., 9 in., 11 in. and 13 in. in diameter respectively. This gives about 463 ft. travel of the saw per minute. The upper or driven wheel is adjusted by means of a pin wrench inserted in holes drilled in the nut for raising and lowering the bearing, as shown. The tension of the saws, which are each 16 ft. long, should be only sufficient to keep the saw straight, as it will not then be as likely to break as when it is drawn up like a fiddle string. A little common sense is all that is necessary for the successful operation of this machine. The guides above and below the table are provided with hardened steel wheels to relieve the friction of the saw. The upper guide may be adjusted to all kinds of work up to 8 in. thick, while the distance from the saw (which passes through the centre of the table) to the arched frame is 27 in., therefore it will cut pieces of metal of that length. The bearing of the upper shaft is pivoted so that it can be adjusted by a set screw. Thus by tipping the wheel either way the saw may be made to run so that it will just touch the steel wheels in the guides. The weight of this machine complete is 925 lbs. The first saws that I tried for cutting the gates off brass and bronze castings were hardened all the way through. They had 14 teeth to the inch, and were three-eighths and half-inch wide respectively. The steel was No. 23 Brown & Sharpe gauge in thickness. These saws would cut very well for, perhaps, ten minutes, when one tooth would break out by being jammed endwise into the tough bronze, where it would stick fast and strip out all or most of the other teeth that were left in the saw. The saw would then be removed and another one substituted, when it was again found that a single tooth breaking would jam in the slit, and strip the entire saw. Both widths of saw used behaved precisely alike, so I then had two band saws made a little harder than those used for cutting wood, with eleven teeth to the inch. While these saws stood very well for perhaps a half hour steady cutting, and without breaking the teeth, I found that it would not pay to entertain the idea of filing the teeth. It would take too much time and these saws would not cut phosphor bronze gates at all, for the sand seemed to be burnt into the surface of the metal, making a skin very hard to cut. I then had two saws made of clock spring steel, with ten teeth to the inch, but with no better results.

From these experiments I concluded that the saw that I was in search of must have about fourteen teeth to the inch, with a considerable set, and about No. 23 B. & S. gauge in thickness. My opinion was that this saw ought not to be more than ¾ in wide, because it could be guided much more easily than the half-inch, especially after the set had been worn off one side by cutting through the sand. The points of the teeth should be so hard that they could not be touched with a file, but the rest of the saw must be soft. In other words, the ideal saw for bronze castings must be hardened only on the teeth. Accordingly, I went to the factory of Henry G. Thompson & Sons, New Haven, Conn., where, after explaining, I procured just what was wanted. With the first saw I cut off 156 gates, equal to about 72 sq. in. of metal same thickness as the saw. The next saw cut 247 gates, equal to 79 sq. in. of metal, while the next saw cut 150 gates, equal to 69 sq. in. of metal and the next cut 126 gates, equal to 90 sq. in. of metal. Some of these gates were 3 in. in diameter, and were of hard bronze, being cut off in five minutes' time each. Many of these gates were 2¼ in. in diameter, some 1¾ in. and 1½ in. of phosphor bronze. We were not particular in cleaning off the sand either. The castings were laid upon the table, and a bit of wood placed under the gate so that as the saw cut through it could not jam. A stick was used to press the gates against the saw, and not much pressure is required. For cutting iron and steel the hard saws might answer, but they will not do for bronze. Every machinist (almost) knows that brass tubing is the worst material to cut with a hack saw, because if the saw is the least bit hard as it comes through the side of the tube the teeth will catch and tear them out. Such persons will be surprised when I say that 6,000 cuts have been made with one saw on brass tubing for gas fixtures with one of these saws before it was dulled enough to lay aside. These saws can be and are used for cutting up all kinds of metal, such as iron, steel, and the alloys, for the reason that in no other way can such material be put into practical shape so cheaply. I feel so much pleased with the success of my experiments that I have been induced to publish these results to aid and encourage my fellow-workmen who might become discouraged and condemn the whole process before they obtain satisfactory results. When these flexible-back saws are dulled they are laid aside, being replaced by new ones, as the cost of each new saw, ⅜ in. wide, is but 85 cents by the roll. In cutting off gates with a hammer and chisel, the gates often break into and spoil the casting, besides it is a slow process, whereas with a band saw the gates can be cut close, quick, and require no filing.

The Mersey Tunnel Railway.

This road, connecting Liverpool with Birkenhead and the Wirral Peninsula of Cheshire, offers the best example of underground railroads in the world, and, therefore, owing to the agitation of the subject of underground railroads, both in New York and in London, it was an object of special interest to the American engineers that visited Europe this summer. At the risk of repeating some facts with which the readers of the *Railroad Gazette* are already familiar, we give herewith some interesting data concerning this great work.

The road is constructed almost entirely in tunnel, of double track width, and the tunnel is lined throughout with brick in cement. The road begins at the central station of the Cheshire lines in Liverpool, and, from James Street station, passes in a direct line under the bed of the river Mersey to Birkenhead. Under the river, which is three-quarters of a mile wide, the tunnel is in sandstone rock, with an average cover of 30 to 35 ft. between the top of the tunnel and the river bed. The lowest rail level is 145 ft. below mean high water mark. The gradients therefore are somewhat severe, being, on the Liverpool side, 196 ft. per mile. The drainage of the tunnel is dealt with in two pumping shafts, one on each side of the river, the water draining to the shafts through drainage headings beneath the tunnel. The pumps raise the water 170 ft. There are three pumping engines on each side of the river, for which both the walking beam and the horizontal types of engines have been adopted. The tunnel is ventilated by four large Guibal fans kept constantly at work. They exhaust from a heading or gallery 7 ft. 2 in. diameter, running parallel with the tunnel, into which there are frequent openings with sliding doors, so that the exhausting action of the fans can be distributed or concentrated at pleasure. Fresh air is supplied to the main tunnel at the stations. By this ventilating system the noxious gases are so diluted that they are rendered harmless and practically imperceptible at every point, and the tunnel is far better ventilated than most stations and public buildings in the vicinity.

Powerful hydraulic lifts are provided on each side of the river for raising passengers from the underground station platforms to the street level 100 ft. above. The power for these lifts is taken from tanks placed in lofty water towers, which form striking architectural features of the riverside stations. The tanks are kept full by small pumping engines, the same water being used over again in continuous circuit. At present James Street station, Liverpool, is used as a temporary terminus pending the completion of the station and connections at the Central Station.

The following facts are of interest:

Permanent Way.—Steel rails, "bullhead" section, 82 lbs. per yard; chairs, each 52 lbs., sleepers spaced 2 ft. 3½ in. centre to centre.

Rolling Stock.—Weight of locomotives, in working order, 70 tons; cylinders 21 in. diameter, by 26 in. stroke; driving wheels, six-coupled, 4 ft. 6 in. diameter; cars lighted with Pintsch's compressed oil gas; rolling stock fitted with vacuum automatic continuous brakes.

Pumping Machinery.—Compound walking-beam engines, 200 horse-power; cylinders, 36 and 55 in. diameter; pump rams, 40 in. diameter, by 15 ft. stroke; compound horizontal engines, working ether double lifting or bucket pumps in balanced sets from quadrants.

Ventilating Machinery at Shore Road.—Condensing, compound engine of 120 indicated horse-power; revolutions, average per minute 45; fan, 40 ft. diameter, by 12 ft. wide; exhausting about 200,000 cu. ft. of air per minute.

Hydraulic Lifts.—Rams, of steel tubes in 12 ft. lengths, screwed together; external diameter, 18 in.; thickness ⅜ in.; average pressure, 90 to 100 lbs. per sq. in.; average speed of lifts, 150 ft. per minute; cages accommodate 100 passengers each lift; about five-sixths of the weight of cages and rams is balanced; cages are lighted by ordinary gas, fed through flexible tubes.

Traffic.—About 300 trains pass through the tunnel per day. Present maximum service, one train each way every five minutes. The largest number of passengers yet carried in one day, 52,000; but the carrying capacity of the tunnel has not yet been fully tested.

Liverpool Docks.

The vast area of docks in the vicinity of Liverpool was a surprise to many of the American engineers. While they were quite familiar with the description of these docks, yet they were not prepared for such immense structures, the dimensions of which exceed those of any other similar structures in the world. The following is a general description of the docks visited:

Herculaneum Dock.—The main feature at this dock is the range of 60 "casemates," tunneled into the rock, for warehousing petroleum in barrels. The front wall is Portland cement concrete; and it and the doors are so arranged that, in case of fire, the store could contain, in bulk, all the oil in that particular compartment. There is storage here for 60,000 barrels.

Coburg Dock Pumping Station.—The surrounding group of docks, of about 50 acres in extent, has been built for many years, and has not the depth of water required for modern vessels; nor can it be obtained by structural alterations, on account of the projection of the Pluckington bank along the frontage. The pumping installation at Coburg dock is provided to raise the water in these docks to a minimum depth of 22 ft., during all variations of high-water level. Access will be gained to these docks, at low neap tides, by way of the modern deep-water docks to the southward; locks being provided in the Union dock. The pumping engines are the work of Messrs. J. & H. Gwynne, of Hammersmith, London. The centrifugal pump fans, three in number, are 7 ft. 6 in. diameter, with 54-in. suction and delivery pipes, capable of discharging in the aggregate 800 tons of water per minute. They are driven by inverted compound condensing engines of 1,500 indicated horse-power.

Waterloo Dock Grain Warehouses.—These were built about 20 years ago, and as it was necessary that they should be available either for grain or for ordinary goods, the warehouses were built after the ordinary system of "floor" warehouses. The aggregate area of floors is about 12 acres, and they are capable of storing about 57,000 tons of grain. Five buckets (each capable of lifting 60 tons per hour), situated in towers disposed around the dock, raise the grain to the top of the warehouse, from receiving hoppers placed below the quay level. The grain is passed by these buckets, through hoppers, to the weighing machines, whence it falls into distributing hoppers. From these it is received on endless traveling bands, which convey it to any part of the upper floor. From this floor the grain is delivered, through chutes, to any required part of the building. Screen machinery and hydraulic lifts are also provided. All this machinery is worked by hydraulic power, with an accumulator pressure of 700 lbs. per sq. in.

Sandon Graving Docks.—A set of powerful pumps has been at work for some years at these docks for increasing the depth of water within the Sandon Dock and over the graving dock sills, on low neap tides, so as to render the graving docks available at such times for vessels of deeper draught than would be otherwise possible. There are five of Messrs. J. & H. Gwynne's "Invincible" centrifugal pumps. Four of these have fans 60 in. diameter, and suction pipes 36 in. diameter. They are driven, direct, by four independent horizontal high-pressure engines. On trial it was found that the maximum combined discharge of the pumps was 513 tons per minute.

Alexandra Dock and Langton Graving Docks.—These docks have been constructed especially for the accommodation of the large steamers employed in the Atlantic trade, and have only been completed in recent years. The arrangement provides an exceptionally large amount of quay and shed space in proportion to the total area of ground occupied—a matter of vital importance to this particular trade. The graving docks are divided by gates in the centre, so that in event of one vessel requiring dry dock accommodation for a long time, it does not interfere with the use of the lower portion of the dock.

Birkenhead Docks.—The site of a large part of the Birkenhead docks was originally a shallow creek of the Mersey, known as Wallasey Pool. The pool has been deepened and substantial masonry walls and quays built all round, with deep water entrances from the Mersey. The older Birkenhead docks were also largely rebuilt, and now provide accommodation for steamers trading to the East and China, and to the South American Pacific coast.

Floating Landing Stages.—The floating landing stages on the Mersey are structures well worthy of notice. Floating at a constant height above the water level, and connected to the shore by long hinged bridges, they provide convenient platforms for rapidly embarking or landing passengers at all states of the tide, notwithstanding its great range of rise and fall—over 30 ft. on equinoctial springs. The stages are used for ferry and channel traffic, both for goods and passengers; and also by large sea-going steamers for cattle. The great landing stage at Liverpool lies opposite the centre of the city. It has a continuous deck, 2,063 ft. in length, and of a general width of 80 ft. It is connected to the shore by seven bridges and by a floating roadway 550 ft. in length and 35 ft. wide, providing an easy incline for wheeled traffic at all states of the tide.

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

It is seldom that one meets with a simple subject upon which the opinions of master mechanics are so at variance as that of the adjustment necessary on the front end of locomotive main rods. In numerous cases most satisfactory results are reported from the use of a solid front end, while at the next turn one learns that several new locomotives have had to be furnished with new stub ends on the main rods, because the trials of the solid ends resulted in a "pound" almost immediately after they were put in use. The difference in service is no doubt largely due to two causes. One, the difference in the exactness of the first fit of the wrist pin in the rod, and the other the wide difference in the opinion of engineers regarding the amount of "pound" in the rod which can be called detrimental. In Europe the solid front end main rod is used with much success, but even there opinion is widely divided on the subject. From observation in this country it looks as if the solid end at the cross-head end of the main rod was a failure: yet it is possible to use it by giving it enough care and attention.

A Western reporter finds the railroads much troubled with hot boxes, fast through trains being obliged to cut out cars at the expense of considerable time and trouble. The cause is "the hot and dry weather." This calls to mind the other extreme. The very cold weather in the Northwest, as well as the heated term, gives rise to an increase in the number of hot journals. In one sense the principal cause may be said to be, not the temperature but the *change* in temperature. A heavily loaded car journal, oiled with what is termed a "winter oil," will not run cool when subjected to the extreme heat of a summer sun, and must not be expected to. Neither will a journal, oiled with a summer oil, run cool when it is exposed to a temperature of 35 degrees Fahr. below zero. In the first case the winter oil becomes so light as to be unable to carry the load, and in the other the summer oil is too hard to feed up through the cotton waste. Undoubtedly, the sand and dust incident to a heated dry term has much to do with the increase of the number of hot boxes, still the use of unseasonable oil is the cause of many of them, and careful officers should, from the lessons of one hot summer, intelligently decide upon the characteristics of the oil to be used in the next. In this can be seen the value of a chemical laboratory in connection with the purchasing department, whose duty it shall be to determine the value of all lubricants at varying temperatures. As matters stand to-day cars may be received for through service with an unknown oil in the boxes, and however careful the oilers may be, there will be many instances of hot boxes which it is almost impossible to avoid. The only remedy is for all railroads to use the utmost care in the selection of lubricants, and constantly avoid the use of an oil which is out of season. This, with proper care and the use of tight journal-boxes, will remove the difficulty.

It would be well for those who are now agitating the question of a proper method of counterbalancing locomotives to have an eye on the reduction of the weights of the reciprocating parts. It is evident that if such parts were without weight the whole difficulty of a proper counterbalance for a locomotive engine would disappear, for there is no difficulty whatever in counterbalancing all purely rotating parts. It directly follows, then, that the greater the reduction in the weight of the reciprocating parts, the smaller will be the liability of any danger from lack of proper balancing. Now, bearing this in mind, what does one see on looking about among the different designs of locomotive engines? On every hand a most unsatisfactory and unscientific method of designing which permits the reciprocating parts of one engine to weigh fully 40 per cent. more than those of another engine of the same general proportions. In some engines the pistons weigh fully twice as much as those in others of the same diameter of cylinder. The piston rods vary ⅝ in. in diameter for the same length, and the crossheads and main rod are heavier by 30 to 100 per cent. in one than in the other. Surely there is much room for improvement here, and it is an improvement that has many resulting advantages. There is smaller first cost, less wear of the bottom of the cylinder, stuffing boxes, guides, crossheads and wrist pins; and, the most important of all, a great change in the weight of the reciprocating parts and the consequent amount of balance needed. We have hanging in this office a piston packing ring only ¼ in. in thickness, which has done excellent service. In torpedo boats are used pistons of about the same diameter as those used in locomotives, but turning wheels at 500 revolutions per minute. These pistons are made of cast steel, and weigh about one-half as much as those used in our locomotive cylinders. Instances are common of similar possible saving in weight in connecting rods, piston rods and crossheads. Why, therefore, should not more attention be devoted to the removal of the necessity for balancing, when the possibilities are so patent and the precedents so numerous?

The Brakemen and the Inter-state Commission.

We are all familiar with the occasional testimony of bodies of brakemen, yardmen and switchmen concerning the use of automatic couplers or other novel appliances. State commissioners or superintendents of railroads or others have collected such testimony, with the result, almost always, of finding that the men prefer the old ways. Why this should be so is evident, on a little thought, and the worthlessness of such testimony has often been pointed out. But now appears another side to the matter. Some 9,000 or 10,000 men who are or have been brakemen on the New York Central and the Boston & Albany and elsewhere unite in a petition to the Inter-state Commerce Commission, appealing to that body to "urge upon Congress the necessity of national legislation in this matter." Those newspapers which have commented upon this petition have generally given it only approbation.

There are two particulars in which this incident is striking: (1) The change in the opinion of the men, and (2) the matter of course way in which the men and the newspapers ask the government to take an active hand in this question. The Commission, if it recommends any automatic coupler, must recommend the M. C. B. type; yet few of the men who sign this petition can have had any experience with this coupler except in mixed trains, when it must have been used with a link, and when they have always insisted that it was more troublesome and more dangerous than the link and pin coupler. They appear to have suddenly changed their minds, but with no new knowledge. It may be quite unjust to say that many, or any, of these 9,000 or 10,000 petitioners have heretofore spoken against the M. C. B. coupler. We would merely say that the class of employés which they represent has done so very commonly in the past. It would be interesting to know if there is any general change of opinion among trainmen.

The appeal to the Commission is very well as a public expression of the men's sentiment that automatic brakes and couplers should be more generally and rapidly put in use in freight service. It is a part of the great public opinion which is acting in the same direction and is growing and must have its effect. We trust, however, that the Commission will recommend no such legislation as is asked for, for several reasons. First of all is that fundamental reason, which so many people seem to be fast losing sight of that the interference of the state in the private affairs of the citizen can only be justified when the evidence that such interference will do more good than harm, is as conclusive as human evidence can be. In the present instance there seems to be no sufficient justification for such interference. Every one now knows that up to two years ago there was neither a continuous automatic brake nor an automatic car coupler that was fit for general use in freight service. Yet laws had been enacted in several states the object of which was to compel the adoption of some form of automatic coupler. Naturally those laws were generally unexecuted. Since the quick-acting brake has been developed, and its capacity been demonstrated, and its manufacture been started on a large scale, now less than two years, it has been taken up with reasonable rapidity in the freight service of the country. The Westinghouse Co. reports 35,000 sets ordered since December, 1887, much the larger part of them for freight cars. The number of cars equipped in the same time with the M. C. B. coupler has been not much less than that of the cars equipped with the new brake. These figures are in themselves large, and represent a great expenditure of money, from $2,000,000 to $2,500,000. Relatively to the number of freight cars to be equipped they are trifling. Unless faster progress be made it will be many years before air-brakes and automatic couplers are in use on freight cars that ought to have them. But what we have held, and still hold, is that the progress has been reasonably fast in the past, and that it will be very much faster in the future, and we doubt the need or the efficacy of any legislation on the subject. As we have said, it is less than two years that there have been such devices, either continuous brakes or automatic couplers, made or procurable, as a conscientious mechanical officer of a railroad could recommend to his company for adoption in freight service. The time that has elapsed has been little enough in which to convince the majority of technical officers that such devices are now available and to demonstrate to managers and directors that there would be economy or even reasonable improvement in operating results in buying them. Indeed there are many mechanical officers of high standing and ability who do not consider that the M. C. B. coupler is yet so perfected in all its lines and dimensions that it is adequate to do the service to which it must be subjected. While we are confident that the companies will find eventual economy in the use of automatic brakes and couplers, and while we know that there will be a great and most desirable saving of life and limb from their use, we do not see that there is sufficient reason for National legislation. We are equally confident that the matter will advance in a healthy, natural way, with all reasonable speed, if left to develop itself without the unnatural stimulus of special laws.

But supposing such laws are passed, is the Inter-state Commerce Commission prepared to undertake the difficult task of seeing that they are executed? A thousand difficulties will at once arise. There are many roads which absolutely could not make the necessary expenditure in any short time; exceptions would have to be made in their cases. There would be hundreds of plausible inventions brought forward, promising to make the brakes and couplers cheaper or more efficient, or both. The technical officers of the Commission would of course have to consider these, whether or not the railroads had already considered and rejected them. These are but suggestions of the complicated troubles that would come up. But we do not believe that the Commission feels so confident of its ability to enforce existing laws as to seek to shoulder new cares.

Brakes on Engine Trucks.

Among the communications in this issue will be found one called out by an editorial on "Some Elements of Efficient Braking," which appeared last week in the *Railroad Gazette*. The writer regrets that greater stress was not laid upon the use of brakes upon the engine truck as well as all the other wheels of the train. We do not think that any decision regarding this question can be made that will be applicable to all classes of passenger locomotives. While a brake system for the engine trucks of one class of engine in metropolitan, suburban and mountainous service may be desirable, yet for other engines in similar service and for like engines in other classes of service the extra complication incident to the application of brakes to engine trucks would not be compensated for by the better results in braking obtained by its use.

For example, one may consider the suburban Forney type of locomotive running on the elevated roads in New York City, and more particularly those locomotives of this type running out of Boston on the Boston & Providence division of the Old Colony. The elevated

railroad locomotives are operating in a service that requires the service stop to be made as short as possible, because the working capacity of the road largely depends upon the minimum time allowed for making a stop; and as the wheels must not be in danger of skidding, it is necessary that the braking power be divided among as many wheels as possible. The foregoing is not equally true of the generality of suburban roads because of the greater distance between stations and the less proportion of time consumed in making stops. Again it is not true of these roads because their carrying capacity does not depend upon the time required to make service stops.

In the case of the Old Colony locomotive mentioned, the weight upon the trucks is enormous, and greater in proportion to the train load carried than almost any other class of locomotive in this country. The locomotives are of the Forney type, with six-wheel trucks, upon which is carried nearly 50,000 lbs., while in the case of an express locomotive on the same road the weight carried upon the truck is only 27,000 lbs., with a weight upon the drivers of 67,000 lbs. These are extreme instances, each being nearly the limit which the two types have yet reached. The heavy weight of the first is caused by a great water and coal capacity, and the reduced weight of the second is brought about by the use of an exceedingly heavy cast-iron foot plate, and two cast-iron back running boards. From the weight alone there is reason for the use of brakes upon the wheels of the engine trucks of one type, and not upon the other, but there are reasons from a structural standpoint also for the omission of the brakes from the express engine trucks, even when their application to the Forney type might be advisable.

The reasons lie in the design of the truck. The Forney engine truck resembles as nearly as possible a first-class metallic swing-motion truck with outside car journals, which are easily cared for, seldom give trouble by heating, and are so located as to permit the application of brakes with few changes and almost no complication with which railroad men are unaccustomed; while the trucks of the express locomotive have inside journals, are continually requiring attention on the road, and are so located that the application of brakes of ordinary design to the outside of the wheels would render the journals less accessible, pilot bracing difficult, and in some cases, such as 10-wheelers, considerable changes in the link motion. If the brakes are to be applied on the inside or between wheels, the problem is even more difficult to get the brake shoes high enough to render their action satisfactory, particularly on trucks where the wheels are necessarily of small diameter.

The increased braking effect to be obtained by the addition of brakes to engine truck wheels of express locomotives is on the average about 4 per cent. of the total braking power of the train for 8-wheel locomotives and 3 per cent. for 10-wheelers and Moguls. In some recent cases of locomotive building, where the weight upon the engine trucks is about 40 per cent. of the total weight of the locomotive, the increase of braking effect is as high as 5.4 per cent., and in such instances the value of the increase approaches near to, if it does not pass, the point where it is advisable to commence to apply brakes to engine trucks. On the other hand, there are locomotives of recent design used in fast express traffic which carry less than 20 per cent. of the total weight upon the truck, and in such instances the increased braking effect would be less than 2½ per cent.

Thus it can be seen that the value of engine truck brakes depends almost wholly upon the nature of the locomotive design. In some cases the distribution of the weight and the arrangement of the mechanical details are such as to render their use most advisable and even necessary. In other instances the conditions are such as to prohibit their use, because the additional braking effect would not offset the disadvantages arising from the obstructions placed in the way of the enginemen, when it becomes necessary to examine the engine truck journals on the road, and the increase of the number of parts requiring the attention of the round-house foreman and the augmentation of the complication of a machine which is becoming as a result of those demands of service which are vital and must be fulfilled, a most intricate mechanism requiring the best mechanical skill to design and to keep in readiness for economical service.

A Railroad "Secret."

The town of Harlan, located on a branch of the Chicago, Rock Island & Pacific, in Iowa, appealed to the Commissioners of that state because the Railroad company curtailed its train service on that branch. It was charged that the earnings of the branch were ample to allow of the old accommodations, and questions to that end were propounded to the railroad officers, who, it is said, made no reply but instead restored the old time table, or at least put on enough trains to silence the complainers. The Chicago *Tribune* takes advantage of this matter to deliver itself of its pent-up feelings regarding railroad statistics in general. It says that voluminous reports are annually made, and yet that to deduce anything satisfactory regarding cost of service is impossible. It continues: "It is well known that railroad officials can calculate these matters to a nicety, and have an algebraic formula by which they can determine the cost of handling freight on any line precisely in accordance with the volume and character of the business and the expense of moving trains. The results, however, are carefully kept from railroad commissioners and the public."

As Horace Greeley used to say, this is important if true. As regards the Harlan case, we do not know whether any statistics of this and other branches were kept by the Rock Island or not. We presume that no regular account is opened with any part of the system, unless some special object is to be attained, but in the case of a small branch it ought not to be much trouble to get items enough together to answer any ordinary questions about expenses or earnings. The public is justified in expecting, at least, accurate information concerning general results, and it is doubtful if a railroad gains anything by refusing publicity, even of such details as divisional earnings and expenses; but one can hardly blame the Western corporations who hesitate to give to hostile commissions such information as will be used, in nearly all cases, only against them. Distorted conclusions are as bad with commissioners as with railroad men. When Western public opinion is ready to judge railroad statistics impartially they will be more readily forthcoming.

That railroad figures are not secret can be shown by the facts in other states. The Louisville & Nashville publishes its results by divisions and branches. Let us take the Shelby branch for illustration. During the year ending June 30, 1888, the passenger trains upon this branch of 19 miles made two round trips each day, the freight trains one. Each passenger train consisted on the average of 3½ cars and carried 42 passengers, who paid .026 cents each per mile. Each average freight train consisted of 11 cars and carried 68 tons at an average rate of .0406 cents per ton mile. The results were: Passenger earnings, $22,840; freight, $31,545; total, $57,466. Operating expenses were $36,384, and rental $15,000, leaving $6,082 profit to the Louisville & Nashville. What more than this do the newspaper critics ask, and where lies the secret kept from the public? In the absence of any surface indication of deceptive statements, it must be assumed that the railroad company has fairly stated the facts, and that any "secret" that may exist is hidden from the railroad officers as well as other people. The most patent commentary is that in Tennessee and Kentucky it has not yet appeared that a fair profit is a crime, or that survival in spite of no profit on one part or branch is a rightful criterion for condemning a profit elsewhere. Precisely in this way the Rock Island doubtless could have told what the station expenses, maintenance and share of general expenses would have come to, and whether the receipts would more than cover these and transportation; in short, could have made a rough estimate of the value of the branch if it had not deemed the case prejudged.

If the Chicago *Tribune* means that it knows of an algebraic formula for determining the cost of transportation in particular instances or upon particular articles, it should at once publish it. The railroad world has long been waiting for such a calculation, though its real usefulness when promulgated may be doubted. In applying known figures and principles to traffic, it is to be expected that men who devote their lives to such questions should have an accuracy of thought, an instinct, a prophetic eye for results, which may well cause the unthinking to declare that these experts have some formulæ not known to the public. Their experienced and ripened judgment is the secret. If men of equal experience and ability were always selected by the states to sit in judgment without prejudice upon these complicated questions, we should hear less about the mysterious difficulties connected with wresting secrets from railroad statistics.

The Hocking Valley Matter.

Stockholders of the Columbus, Hocking Valley & Toledo Railroad were surprised a month ago by the assertion of President Shaw in an interview that the company would default Sept. 1 on the interest then due upon the $8,000,000 consolidated bonds. These stockholders wondered what had so suddenly brought about such a state of affairs, and it was even said that earnings had been put to some illegitimate use by President Shaw and his directors. That this is not correct may be shown by a brief comparison of operations during six months of 1888 and 1889.

JANUARY 1 TO JULY 1.

	1888.	1889.
Revenue—Passengers	$181,630	$160,180
Freight	1,027,566	880,763
Mail and Miscel	76,903	56,717
	$1,286,100	$1,097,660

In 1888 this six months' revenue was 45 per cent. of the revenue for the year.

Expenses of operation for the same periods were:

	1888.	1889.
Maintenance of way	$130,377	$107,860
Maintenance of engines and cars	101,335	70,661
General expenses	56,309	100,111
Conducting transportation	416,269	398,975
	$704,292	$677,609

General expenses show an increase of $50,000, owing to legal expenses, but with this exception, the expenditures for 1889 are all normal and show an economical and proper working of the road. The fact that the percentage of decrease in expenses is not as great as the decrease in revenue is not a subject of just criticism if the items are fair, for, as every one knows, the proportion of reducible expenses to those which are fixed is small.

These figures leave the net revenue for 1888 $581,806 and for 1889 $420,054, from which are to be deducted taxes, about $35,000, and six months' interest on bonds, about $500,000. Evidently there would be on Sept. 1 (adding one month's revenue) very nearly or quite enough income to pay the fixed charges then due. President Shaw says he has no money. What did he do with it? No balance-sheet is submitted; still we can tell almost to a certainty. The general account of the road for 1888 had, among others, the following items:

Bills payable	$112,700
Lease warrant	60,134
Due on other accounts	302,793

And in the income account is an item of $23,757 for interest on floating debt. President Shaw and other officers declare that now there is no floating debt. This is confirmed by private persons, who say that the debts due them by the railroad were paid off and cancelled. Hence the reason why no net revenue is now available for interest on the mortgage—it has all been taken to pay off the floating debt.

It is now clear that the company can borrow the money for this interest (arrangements for which are practically completed) and be in no worse condition than if earnings had been taken for fixed charges, leaving the floating debt unpaid. This fact must relieve the minds of the stockholders, who may have supposed, from tales told reporters, that the company was practically bankrupt.

Pressure was brought to bear upon President Shaw, who resigned, and a new president, C. C. Waite, late of the Cincinnati, Hamilton & Dayton, was appointed, with G. D. Davis, of New York, as Vice-President, and a new board of directors.

The only plausible explanation of the action of the old president and board of directors is that they were determined by all possible means to compel the road to repudiate the $8,000 000 bonds so long in controversy. If default should be made, the holders of these bonds would, practically, again have to prove title. A year ago the arbitrators decided against the company, who tried to have the defendants, Burke and his associates, compelled to make restitution of this money, alleged to have been taken without compensating the Hocking Valley Co. The ground of this decision was (1) that Burke got only such an amount as was really created by his happy combination of three separate roads, whose combined property was increased that much in value, and (2) that corporation capital is not a trust, but practically a property to be disposed of by the owners and their agents. It is generally admitted that now no holders of these bonds but those tainted with knowledge of the original transaction can in any case be refused payment, and President Shaw's idea seemed to be that default would bring these tainted bonds to light if there were any.

The Hocking Valley road has not done as large a business this year as in 1888, when it paid all charges and had a surplus of $232,011, which amount should be available now in addition to net earnings of 1889. The coal trade, like others, has suffered by the open winter and the partial failure of crops in the Northwest; but those must be considered exceptional circumstances, and if, in spite of them, the gross earnings January to July show a falling off of only $200,000, it is fair to assume that the road can continue to earn its fixed charges in the future.

European Tendencies in Locomotive Boiler Pressures.

Personal observation in Europe leads one to a fuller appreciation of the widespread interest taken in the search for the most economical high steam pressure for locomotives than is to be obtained from the technical newspapers. For some reason this subject, so far as it concerns locomotives, has been neglected by the foreign mechanical journals of late; meanwhile, however, the discussion of higher pressures for marine service still continues with unabated energy. The condition of the question is unsettled, but the evident tendency is toward higher pressures and a greater number of expansions.

The highest pressure yet used is that on the three-cylinder compound locomotive on the Northern of France. That locomotive was built about one year ago and has been tried under the most severe conditions obtainable on the lines of the road. The steam pressure is about 214 lbs. above the atmosphere, per square inch. With this pressure there was at first experienced some difficulty in keeping the packing tight, but after a little experimenting all trouble of that nature was

removed and the results of one year's experiments with this locomotive were so satisfactory that it was decided to show it at the Paris Exhibition. The valve motion of this locomotive has rather too many parts and the engineers of the line are still discussing the advisability of such a motion on any considerable number of locomotives. Such complication is, however, unnecessary and is not to be regarded as an essential feature of locomotives using higher pressures. Its use on this locomotive is for the purpose of obtaining the best distribution of steam. The reader who has examined French locomotives will remember that the designs are, as a rule, complicated, and, therefore, probably the complication of the engine in question is, in comparison with others in use in the same country, no greater than some of those with which we are familiar here. But leaving out all questions of detail, the trial of higher pressures on the Northern may be said to indicate that considerable advantage is to be expected from an increase of pressure, and there is every indication in the conversation of the officers of the road that they intend to continue to use the highest pressure compatible with economical mechanical construction. Further indication of this may be found in the change recently made on the same road in the steam pressure of the standard 8-wheel type of engine from 153 to 184 lbs. per square inch. Indicator cards from the compound locomotive carrying 214 lbs. show that the expansion is about 6 times when the cut-off is at 45 per cent. in the first cylinder, and the terminal pressure is about 2 lbs. when the cut-off is about 25 per cent. in the high-pressure cylinder. The probabilities of great economy as a result of such pressures and expansions will too readily present themselves to the reader to require further notice here.

On the Paris & Orleans the steam pressures have been raised to 180 and 200 lbs. per sq. in. as a standard for the different classes of engines. These engines are not compounded, but are of the ordinary type, with extra strong boilers. Conclusive experiments have not as yet been made to show the increased economy of the higher pressure, but the indications from the general observation are such as to have led the Engineer in Chief of the line to raise the standard pressures as above stated. Other locomotive superintendents in France are looking with considerable favor on an increase of boiler pressure, and the indications are that before long authentic experiments will be published which will indicate just what the economy is and wherein it is obtained.

In Germany, particularly on the Saxony State railroads, much attention has been paid to this subject, and the new compound two-cylinder locomotives carry about 184 lbs. per square inch, with no trouble whatever from the boilers or in the valve gear. The gain in work done by these locomotives over those of single expansion carrying lower pressure is about 20 per cent. How much of this is due to the simple fact of double expansion or compounding, and how much to simple increase of pressure, is not yet decided, but it is believed by German experts that the increase of boiler pressure has more to do with the required gain than the mere fact of compounding; yet it must be remembered that it is hardly practicable to get in one cylinder the degree of expansion necessary to obtain all the possible advantages from higher pressures. Conversation with German mechanical officers confirms the impression that they are inclining to the highest pressures compatible with limits imposed by structural difficulties. In Great Britain one finds 180 lbs. per square inch quite common in locomotive service, and Mr. Worsdell, of the Northeastern, is now building compound locomotives with ⅝-in. steel boilers to carry 200 lbs. In addition to the foregoing, instances might be cited of the use of higher pressures in Belgium, Switzerland, Italy and Russia, all of which confirm the impressions outlined above. In some localities the tendency is more pronounced than in others, but nearly all agree that a desirable economy will result from the changes.

All of this simply confirms the growing belief to the same effect, which every one has noticed in this country; and the conviction that it is practicable to materially raise boiler pressures may be said to be general. To no small extent this widespread unanimity of view results from the increased confidence felt in the uniform toughness and strength of the steel now obtainable. It must also be taken into account that the more accurate knowledge accessible regarding the value and reliability of the various forms of laps and systems of riveting is also an important factor. This has a decided influence on the minds of timid engineers of the old school who were brought up with iron boilers and without testing machines and mechanical laboratories. The mechanical department of the Pennsylvania Railroad has in contemplation a series of experiments on this subject which will be watched with interest, and when is is remembered that the Baltimore & Ohio and other roads are interesting themselves in the subject of compound locomotives with a view of immediate trials of such engines, it will become evident that the near future will witness the use of locomotive boiler pressures from 16 to 30 per cent. higher than those common at the present time.

The Train Rule Committee of the General Time Convention has issued, through Secretary W. F. Allen, an official edition of the Standard Code, including all the amendments to date. The book is issued bound in cloth, at 50 cents per copy, and is printed in the form usually adopted by railroads for employés' use. The pages are 4 × 6 in., and the notes of the committee heretofore appended under various rules in small type are placed by themselves at the close of the book. The forms for 19 and 31 train orders are not given full size, being reduced to fit the pages of the book. The imperfect and unsatisfactory figures showing the motions for hand and lamp signals are continued, and the committee have added, as directed by the convention, 17 diagrams showing the manner of using flag and lamp signals. These diagrams are colored, and serve their purpose very effectively. They are similar to those issued last year by General Superintendent Wade, of the Wabash, and described in the *Railroad Gazette*, though some minor improvements have been made in the original drawings. The position for classification flags and lanterns on locomotives is near the top of the boiler, about 2 ft. back of the smoke stack, or where the boiler and smoke-box join, and the two signals on the opposite sides of the boiler are placed about 3½ ft. apart. The standard flag is 16 in. square, on a stick 22½ in. long. Secretary Allen is prepared to receive orders for editions of this work for the use of individual railroad companies at $150 for 500 copies, or $200 for 1,000 copies. The alterations of the type which are necessary in the flagging rules and elsewhere for the purpose of inserting distances and times will of course necessitate a slight addition to these prices.

The resignation of Mr. E. T Jeffery, General Manager of the Illinois Central, which has been for a long time threatened, has at last been peremptorily offered and accepted. We do not propose to discuss here the causes which led to or the results which will follow this resignation. We wish simply to say that the road loses a general manager who is a manager, and not a head clerk or a figure-head. Mr. Jeffery's force of character, his energy and his grasp of the general principles and the details of his profession have been unceasingly used in the service of his company, and have made him a strong and conspicuous figure among the railroad men of the West.

NEW PUBLICATIONS.

Cape Fear & Yadkin Valley Railway. This North Carolina company has issued, through the press of Allen, Lane & Scott, of Philadelphia, a handsome hand-book describing the road and the fertile country through which it passes. The agricultural and mineral resources and the salient characteristics of the towns, with the industrial possibilities, are well and fully described and the statistics are apparently gathered with care. The numerous subjects for the full-page direct-process illustrations have been selected with excellent taste.

TECHNICAL.

Locomotive Building.

The Concord road has received 3 ten-wheeled engines from the Manchester Locomotive Works.

The 11 engines building for the Baltimore & Ohio by the Baldwin Locomotive Works will have the grates, fire-boxes, exhaust nozzles, etc., arranged for coke burning. The engines have 19 × 24 in. cylinders, drivers of 66 in. diameter, and boilers 58 in. in diameter at first ring.

Car Notes.

The Cleveland, Akron & Columbus has ordered 600 tube iron freight cars.

The Pullman shops are to build 500 freight cars for the Chesapeake & Ohio.

The Lafayette Car Works have received an order from the Toledo, Ann Arbor & North Michigan for 100 box cars and 100 gondolas.

Bridge Notes.

The following bids were received by the County Commissioners for the iron bridge at the foot of Polk street, Jefferson, Tex.: Geo. E. Knight Bridge Co., $5,050: Kansas City Bridge and Iron Co., $6,398: Missouri Valley Bridge and Iron Works, $6,770; Kelly Iron Bridge Co, $6,725; The Smith Bridge Co., Toledo, O., $6,820; Penn Bridge Co., $5,960; The Berlin Iron Bridge Co., East Berlin, Conn., $6,520. The Geo. E. Knight Bridge Co secured the contract.

The city of Augusta (Me.) is to build a new iron bridge across the Kennebec to replace an old structure.

The Wrought-Iron Bridge Co., of Canton, O., is to build a 125 ft. bridge in Canton. The price is $6,264, and this company was the only bidder.

A special committee, appointed by the County Court, recommends the construction of an iron bridge across Comey Fork River, at Lancaster, Tenn., costing, with superstructure, about $4,000.

The New York & Long Branch Railroad will build an overhead bridge at Little Silver, N. J.

The County Commissioners at Cincinnati, O., will receive proposals for a wrought-iron truss and a wrought-iron girder bridge.

The Schuylkill & Lehigh Valley Railroad is to build two 1,500 ft. bridges.

The pontoon bridge over the Missouri River at Leavenworth, Kan., is now in use. The river at this point is about a mile wide and there is a draw section of 400 ft.

The following bids for constructing an iron bridge were received by C. H. Gillett, City Engineer, Appleton, Wis.; Minneapolis Bridge Co., Minneapolis, Minn, substructure, tubular piers, $9,000. Milwaukee Bridge and Iron Works, Milwaukee, Wis., superstructure, $7,000; substructure, tubular, $950; total, $7,950. Milwaukee Bridge and Iron Works, superstructure, $7,000; stone, $9,000; total, $16,000. Milwaukee Bridge and Iron Works, superstructure, $7,000; stone, $5,000; total, $12,000. F. Weinhagen, Wauwatosa, Milwaukee County, Wis., substructure, tubular, $9,450; stone, $15,325—$19,150. E. J. Lane, Chicago, Ill., substructure, tubular, [$8,575. Pittsburgh Bridge Co., Pittsburgh, substructure, $9,200. A. Y. Bayne & Co., Minneapolis, Minn., substructure, tubular, $9,350. Wrought Iron Bridge Co., Canton, O., substructure, tubular, $9,875.

The County Commissioners at Clarion, Pa., ask for proposals for an iron bridge over Clarion River, near that place.

E. G. Bower, County Judge, of Dallas, Tex., will receive proposals for an iron bridge over Trinity River.

Manufacturing and Business.

A new marine and stationary engine has just been put on the market. It is an upright duplex high-speed engine, making as high as 3,000 revolutions per minute, and is instantly reversible. Mr. C. G. Emery, of New York City, became interested in the invention, and tried the first engine that was built in his steam launch on the St. Lawrence River. Its performance was so excellent that he has taken up the manufacture of it. The Ames Manufacturing Co., of Chicopee, Mass., makes these engines, and the Hussey Re-Heater & Steam Plant Improvement Co., 15 Cortlandt street, New York, has taken the general agency for their sale. The inventor of the engine is E. G. Shortt, of Carthage, N. Y.

The Secretary of the Navy asks proposals for furnishing machine tools at the Brooklyn and Portsmouth navy yards.

A Fishkill-Corliss steam engine of 1,000 H. P., embracing all the latest improvements, is now under construction at the works of the Fishkill Landing Machine Co., at Fishkill-on-the-Hudson, N. Y., for the new grain elevator of the New York Central & Hudson River Railroad at 63d street, New York City. The engine is upright, with the cylinder at the top, and is furnished with air-pump and condenser. The band wheel is to be 18 ft. in diameter, and will weigh about 35 tons.

The National Lock Washer Co., of Newark, N. J., has just received an order from Loudon for 1,250,000 of the nut locks manufactured by that company. Over half a million locks were shipped last week.

Messrs. Hines & Hanover have secured the contract for constructing the water works at Napanee, Ont.

Bids for the construction of the machine and repair shops of the Mississippi Valley road at Vicksburg will soon be advertised for. The plans have been approved by President Wilson, and are for shops 1,200 ft. in length, to cost about $100,000.

The Chicago Railway Metal Tie Co., of Chicago, has been incorporated by William D. Fetherick, William J. Kenney and F. Newton Rice. The capital stock is $200,000.

Iron and Steel.

A. Dauderveer, of the Albany Water Commission, asks proposals for iron pipe and fittings.

Smelting works are to be erected at Dudswell, at the junction of the Quebec Central and Hereford railroads, in connection with the Harvey Hill iron mines.

The Ironton furnace, Buffalo, N. Y., was blown in last week after sixteen years of chill. It will probably find plenty to do in supplying the Buffalo jobbing trade, and that is doubtless all its managers expect to do. The works have a capacity of 120 tons a day.

The works of the Seattle Iron and Steel Co., at Gilman Park, Wash., are going up rapidly. An additional force of men has been put on the buildings, and castings will be made inside of a month. A number of contracts have been taken for iron fronts for buildings. The ore will be taken from the Kirkland mines and smelted at these works.

Potts Brothers Iron Co. and the Glasgow Iron Co., of Pottstown, Pa., have increased the wages of their puddlers from $3.20 to $3.50 per ton and their other employés have been given a corresponding advance.

The Seyfert rolling-mills at Gibraltar, Berks County, Pa., has started up full-handed. This mill has been running only a few furnaces for some time. A representative of the company has been engaging puddlers to work in the mill at $4 a ton.

The stockholders of the Lebanon Iron Co, Lebanon, Pa., have decided to build an addition to the works, doubling the capacity.

The Pennsylvania Bolt and Nut Works at Lebanon have been sold to an English syndicate. The capital stock is $500,000. An eighteen inch train will be put in.

The *Manufacturers' Record* learns that a New York syndicate will purchase one or more fully-developed extensive iron properties in the South. The *Record* also reports the sale of the Embreeville Iron Works, comprising about 45,000 acres of timber and mineral lands, near Jonesborough, Tenn., to an English company, who will develop the property on a large scale and also the organization of two companies, with a capital stock of $1,000,000 each, to build a town at Waynesborough Junction, Va., and develop large iron properties there.

The rolling mill, pipe and tube mills and foundry of the Reading Iron Co., after an idleness of six months, resumed partial operations Sept. 2, and within a week are expected to run full-handed, when 2,000 men will again be steadily employed. The company's sheet mill is already running, with 300 men.

The Pottstown Iron Co., of Pottstown, Penn., has increased the wages of the 500 puddlers in its three mills from $3.25 to $3.50 per ton, to take effect Sept. 16. A year ago nearly all the mills in the Schuylkill Valley were paying $3 per ton, and since then nearly all have increased wages, until a large majority are now paying from $3.40 to $3.85 to puddlers, and all other employés in proportion.

The Rail Market.

Steel Rails.—The market at New York is quiet; sales, 3,000 tons to Eastern Pennsylvania and 5,000 tons to the West; quotations, $28@$28.50 at mill. At Chicago the market is strong and sellers refuse to name prices beyond December delivery; standard sections, $32@$32.50; small sizes, $35.

Old Rails.—New York bolders ask $25 for tees and $26 @$27 for foreign double heads. At Pittsburgh the market is dull at $25@$26 Old steel rails sell there at $20.50 for long lengths; at Chicago the quotation is $18.

Fastenings.—Pittsburgh: Spikes, 2.10; Splice bars, 1.75 @1.85; Bolts, 2.75@2.85.

Notes.

The Miami & Erie Transportation Co. proposes to lay a pipe line from the Mercer oil and gas fields to Lockland, O., 130 miles.

The steel in the Illinois Central bridge spanning the Ohio River at Cairo, Ill., is now all in place, and nothing but riveting is to be done to finish the structure. The contractors have until Dec. 31 to complete the bridge, and will probably finish the work considerably within that time.

Among other improvements recently made by the Walker Manufacturing Co., Cleveland, O., one of great importance has been the building of a very large pit lathe capable of turning work up to 30 ft. diameter by 8 ft. 6 in. face. This lathe is a combination tool, it being not only a pit lathe, but also a huge planer, in which surfaces 30 ft. long by 8 ft. 6 in. wide can be planed. It also has facing attachments for the proper facing up of the ends of columns and girders. In addition there are gear-planer attachments whereby the teeth can be planed in gears of any size up to 30 ft. diameter and of any proportions desired. This tool places the Walker Manufacturing Co. in the best possible shape for the production of this heavy class of work. The company is crowded with work on several large contracts for cable machinery and other heavy work.

New Shops of the Long Island Railroad.

The new shops of the Long Island Railroad Co., near the village of Jamaica, which were commenced in February last, are now practically completed, and the formal removal of the works from their present location at Hunter's Point will probably take place on or about Nov. 1.

The new buildings are of red brick, with granite foundations and trimmings. They consist of two large main structures, running north and south, respectively 547 × 85 ft. and 420 × 100 ft.; a blacksmith shop 100 × 60 ft.; a boiler-house 35 × 45 ft.; an engine-room 26 × 45 ft., and a store and pattern room, all separated from each other. The larger of the two main structures comprises a paint shop, 239 ft. long, capable of accommodating 14 cars; a car shop, 214 ft. long, and a mill room, 89 ft. long, where the lumber will be prepared. These three shops are the full width of the building, 85 ft., and the height to the centre of the roof is 30 ft. The flooring consists of combined Trinidad and Neufchatel asphalt pavement.

The machine shop, 420 ft. long and 60 ft. wide, with an annex 40 ft. wide running the entire length, has accommodations for 16 locomotives, and is fitted up with two traveling cranes with a joint capacity of 50 tons, furnished by the Morgan Engineering Co., of Alliance, O. Two driving shafts will run the entire length of the building, one for the machinery and the other for the cranes. A boiler shop is located in the north end of the annex. The smith's shop will contain a large furnace, two steam hammers and 13 forges, and will be fitted up with exhaust flues for carrying off smoke and heat. The boiler house will contain three 75 H. P. boilers built by the Bigelow Co., of New Haven, Conn These boilers will supply steam for heat as well as power. Adjoining the boiler house on one side is a large building for a coal bin, and so fitted that the coal will drop into it from the cars, which will be run on a trestle overhead. On the other side of the boiler house, and really part of it, is a large building for an electric light plant. The shops will be lighted by electricity whenever it may be necessary to work at night, or in the winter time when the days are short.

Three 225 H. P. Westinghouse automatic engines will drive the machinery in the several departments. Between the boiler house and smiths' shop stands a 125-ft. chimney. Between the two main buildings will be a 78-ft. transfer table supplied by the Yale & Towne Mfg. Co., of Stamford, Conn. A round-house to take in 50 engines is also to be built. Much of the machinery at present in use at Hunter's Point will be transferred to the new works, but a large quantity of new and improved machinery is to be put in. It will be supplied by Manning, Maxwell & Moore, of New York.

While the new works will not be the largest in the country, they will be among the most complete in design and appointments. The total cost will be about $175,000. The contract for building them was given to the Flynt Building & Construction Co., of Palmer, Mass.

The St. Clair Tunnel.

General Manager Hickson, accompanied by Superintendent Stephenson, Chief Engineer Hobson, Mechanical Superintendent Smith and several other officials of the Grand Trunk visited the new St. Clair railroad tunnel recently. At the American end of the tunnel while the party was there the shield was driven into the earth a distance of 23 in. in 20 minutes by 13 of the 24 rams. It is expected that the shield will be lowered and work resumed on the Canadian side within the next three weeks.

Metal Ties and Locomotives for Mexico.

The *Iron Trade Journal* states that a contract for 100,000 steel ties was placed by a Mexican Railway Company in the Cleveland district, England, at £5 per ton; and that locomotives and tenders, valued at £14,000, were shipped from the Clyde for Vera Cruz a few days since.

Laird Brothers' Birkenhead Iron Works.

One of the most interesting works visited by the American engineers in England was that of Messrs. Laird Brothers at Liverpool. This firm was founded in 1824 by William Laird, the father of the late John Laird, M. P.; and since its establishment it has built, including those now in hand, 576 vessels, having an aggregate tonnage of over 350,000 tons, and an aggregate indicated power of over 304,000 horses. A large proportion of this work has been done to the order of the British Government, while many foreign and colonial governments have also been considerable customers. Notwithstanding the exceptional quantity of government work that has been done at this establishment, merchant ships and steamers have always had a large share of attention, and many famous and successful vessels of the mercantile marine have been constructed here. Special attention has been given to the design and construction of steamers for river navigation in all parts of the world, some of which have been pioneers in opening up rivers which are now important channels of commerce; among them the "John Randolph," the first iron steamer ever seen on American waters.

They are now building at these works two very fast torpedo gunboats of an improved "Rattlesnake" type. Dimensions: 230 ft × 27 ft. 6 in. × 14 ft. 9 in., and with engines of 4,500 I. H. P.; speed, 21 knots per hour; also steamship "Gazelle," for the Great Western Railway; two twin screw steamers, "Lynx" and "Antelope," for the fast Channel service of the Great Western Railway; these are 235 ft. × 27½ ft. × 13 ft. 2 in., with engines of 1,600 I. H. P. and rated speed of 16 knots per hour; the steamship "Russia" for the Hamburg-American Steam Packet Co., which is 373 × 44½ × 33½ ft., with engines of 3,300 I. H. P. One large dock is permanently covered in and has overhead power-driven traveling cranes with traverse in two directions.

The boiler-shop, completed last year, has turned out boilers weighing 75 tons each It consists of four buildings parallel to one another and covering in all 6,000 sq. yds. Boilers are transferred from land to the vessels by a 50-ton crane. At the quay adjoining the boiler works the Hamburg & American Steam Packet Co.'s steamer "Columbia" is now nearing completion. Her dimensions are 463 × 56 × 36¼ ft., propelled by twin screws, with triple expansion engines of 12,500 I. H. P., supplied with steam at 150 lbs. pressure per square inch, from 9 cylindrical boilers. She is fitted for 400 first-class, 120 second-class and 680 steerage passengers. The decorative work of the principal saloons and staircase is by Messrs. Bembe, of Mayence.

After inspection of these shops the American engineers were entertained at luncheon by Mr. Laird at his residence.

Paris Exhibition Notes.

The exhibit of pressed steel at the Exhibition is a good one, and shows, probably more than any other display, the tortuous shapes in which good steel can be worked without fracture. Immense boiler plates, tender frames and other engineering details are shown made from one single large piece of steel without perceivable fracture. The new presses of the Fox Pressed Steel Co., of Joliet, Ill., are expected to do this class of work.

The Worthington Pumping Engine Co. have a large exhibit, and, in order to aid visitors in the examination of their different plants, they distribute plans of the whole grounds upon which are marked with red flags the locations of their display. The following is a list of the exhibits and description of the various plants:

Pumping station, Quai D'Orsay, Worthington high-duty pumping engine for the water supply of the exhibition; also two Worthington boiler-feed pumps and one steam-jacket pump, all in operation.

Eiffel tower, south leg, two Worthington compound condensing pressure pumping engines for operating the Edoux lifts and pumping water to the top of tower, a height of 984 ft.; also two Worthington independent condensers, and two Worthington boiler-feed pumps for feeding the Collet boilers against a pressure of 150 lbs. per square inch; all in daily operation.

Electric syndicate station, Quai D'Orsay, two Worthington boiler feed pumps, in operation.

Panorama of the International petroleum exhibit, Quai D'Orsay, Worthington pressure pump in miniature exhibited as model of Worthington pipe line engines. Panoramic view showing interior of oil line pumping station, with Worthington high-duty oil line pressure pumping engine can also be seen here.

Pavilion of Argentine Republic, Worthington boiler-feed pump in connection with refrigeration and preservation of meat in transportation, in operation.

Electric syndicate station near Machinery Hall, Worthington boiler-feed pumps, in operation.

United States section, Machinery Hall, Worthington regular pattern pump.

Exhibit of Babcock & Wilcox Co., rear of Machinery Hall, two Worthington boiler-feed pumps, in operation.

Exhibit of Société de Naphte, Quai D'Orsay, Worthington petroleum and refinery pump.

Palais du Trocadéro, Worthington boiler-feed pumps, in operation.

Exhibit of Ministry of War, Eslande des Invalides, Worthington boiler-feed pump in electric lighting station, in operation.

A Pacific Cable.

The San Francisco Chamber of Commerce recently appointed a committee to investigate the feasibility of laying an ocean telegraph cable from San Francisco to Australia, which has reported in favor of the project, and estimates the cost of a cable line from San Francisco to New Zealand, by way of Honolulu and Tutuila, at $10,000,000. The cost of cabling from Sydney to London, it is estimated, would be reduced to 87 cents per word. It is suggested that the United States Government grant a subsidy for the purpose, to the extent of guaranteeing three per cent. a year on an investment of $10,000,000 of bonds to be issued by a company incorporated under the laws of the United States.

THE SCRAP HEAP.

Notes.

The Toledo, St. Louis & Kansas City will soon put on through night trains.

The Wabash has just built a handsome new station 40 × 157 ft. at Moberly, Mo.

The first through mail from China and Japan passed through Canada en route for England a few days since.

The Louisville, St. Louis & Texas shops at Henderson, Ky., were burned last week, entailing a loss of $20,000 upon the company.

The passenger trainmen on the Milwaukee, Lake Shore & Western have been armed with revolvers, and each car on a passenger train is to be equipped with a rifle.

It is stated that the Chesapeake & Ohio has decided to build a handsome passenger station in Louisville, Ky., at the foot of Seventh street, and that the plans are completed.

The Missouri Pacific has ordered a restoration of the salaries, which were reduced 10 per cent. some months ago. The change affects only about 1,000 employés, it being confined to the higher grades.

It is stated that the Chicago, St. Louis & Pittsburgh and the Jeffersonville, Madison & Indianapolis will put on new through night trains between Chicago and Louisville, to run through in 8¼ hours. The fastest time now made is 11 hours.

The freight handlers in the Lake Shore & Michigan Southern freight house at Toledo, O., struck last Sunday, demanding double pay for Sunday work. The checkers and tallymen at the same time struck for pay for overtime. The outcome of the strike seems to be uncertain.

The Congo Railroad.

The prospectus for an issue of 20,000 shares, $100 each, of the capital stock of this railroad, 271 miles long, from Matadi to Stanley Pool, is issued. The entire capital of 25,000,000 francs (£1,000,000 sterling) is divided as follows: 10,000,000 francs in 20,000 capital shares subscribed by the Belgian government, giving a right to 3½ per cent. dividend, and redeemable at 500 francs (£20), and 15,000,000 francs in 13,000 ordinary shares of 500 francs (£20), giving a right to 7 per cent. dividend, redeemable at 1,000 francs (£40), and entitled to a supplementary dividend at the rate of 50 per cent. of the remaining divisible profits. The ordinary shares redeemed will be replaced by "Jouissance" shares entitling the holders to participate in the dividends as stated in Article 40 of the Statutes. This road, which is projected to avoid the rapids in the Lower Congo, has a concession from the Congo government for 99 years, with a land grant of a million and a half acres of land, besides a strip one-eighth of a mile wide extending the full length of the road. The route has been surveyed and plans made by a staff of Belgian engineers, who estimate that the line can be built and equipped and ready for working for a sum, which, with the expenses of the establishment of the company and interest during construction, as above stated, will not exceed 25,000,000 francs ($5,000,000), being the amount of the capital of the company. It is expected that the road will be opened and in working order within four years, when, as the prospectus states, "the distance will be traversed in two days of twelve hours." Of the sixteen members of the Council of Administration, all except two Englishmen seem to be Belgians. As the great number of thoroughly trained railroad laborers of African descent in this country might induce some of our contractors to look for work in that direction, we add that Mr. Robert Ryrie, of 34 Park street, Grosvenor Square, London, is one of the council.

How the Scalper Scalps.

A Denver reporter gives the following to the world: In a scalper's office yesterday a gentleman wanted a ticket to Chicago. One was offered him at $18.

"Is it safe?" asked the customer.

"Yes sir, perfectly safe. If you buy it we will punch out your description in the margin here and no questions will be asked" The man took the ticket and saved $12.65 by the transaction.

"How do you get such tickets?" asked the reporter.

"Buy them from excursionists. The companies sell them and accidentally on purpose forget to punch out the description on the margin, so we do it for them. They make nice tickets to handle, but the Union Pacific sent out the best ones this time. They are a simple straight ticket with the usual conditions 'not transferable' and all that, but the customer is not required to sign it until he starts home; so that no other name appears upon it; it is good for anyone. * * * Oh, yes, of course, the railroad companies know it, and they never make us any trouble as they used to before the Inter-state Commerce act. We help them dodge the act when they want to, so they have to stand in with us. See?"

The Newport News Dry Dock and Shipyard.

The plans for the great dry dock and ship-building plant, now in course of construction at Newport News, Va., by the Chesapeake Dry Dock & Construction Co., of which C. B. Orcutt is President and Collis P. Huntington, of New York, the principal owner, and which will involve an expenditure of upward of $1,500,000, are being prepared by Otto C. Wolf, of Philadelphia. A dry dock of 600 ft. long is being completed. A machine-shop, 308 × 50 ft., and completely filled with tools recently purchased, is finished and in working order. In addition to these, says the *Iron Age*, there will be a tool-shed, 120 × 208 ft; a ship blacksmith shop, 280 × 40 ft.; a bending platform and furnace, 100 × 130 ft.; a three-story brick carpenter, joiner and pattern shop and molding loft, 306 × 60 ft.; a blacksmith shop 306 × 60 ft.; a brick and iron boiler and machine shop, 100 × 306 ft., with a smaller machine shop for fittings, etc, adjoining, 50 × 306 ft. The gentlemen concerned are interested in the New Orleans, Texas and Brazilian steamship lines, for which they will build, and their plan is to engage in a general business, taking contracts either for the merchant marine or for the Government.

Concerning this enterprise the Baltimore *Sun* says: The company expects to give employment to 1,000 men. It is expected that the works will be ready to lay the keels for four large freight steamers early in the coming year. The heads of several of the departments will go from Philadelphia. Henry Konitzy is to be general superintendent. He has been with Cramp & Sons for 15 years as superintendent of construction. Mr. James Younger, superintendent of the engineering department at Cramps' yard, will hold a similar place at Newport News.

Automatic Brakes and Couplers.

A petition signed by T. T. Slattery, of the New York Central, E. L. Barnard, Boston & Albany; W. H. Lyons, Boston & Albany; E. M. Hardie, New York Central, and 9,678 others, has been sent to the Inter-state Commerce Commission praying that body to take such steps as it may deem proper to bring about the adoption of automatic brakes and couplers on freight cars on the railroads in the United States. Each of the signers is in actual service as a brakeman, or has been so employed a sufficient length of time to become fully acquainted with the duties and perils of the position.

The Simplon Tunnel.

Very probably the Simplon Tunnel scheme will now be carried out, since a powerful company of German capitalists has succeeded in securing an amalgamation of the two Swiss railways running from Lucerne to the foot of the mountain, and guarantees to provide 30,000,000 of francs for carrying out the work. Italy, under the proposed scheme, will possess one end of the tunnel, and provide 15,000,000f. Now the whole line connecting Lucerne, Berne, Pontarlier, Geneva and the Simplon is, like the St. Gotbard Railway, under German influence. The new company favors an immediate piercing of the Simplon, and guarantees a subvention of 30,000,000f. ($6,000,000). They have accepted a scheme for a tunnel at the base of the mountain with the southern mouth in Italy, and that country will contribute $3,000,000. There is little doubt that the Swiss government will now accept this proposal. The whole plan is of great importance to Germany and Italy, both commercially and strategically. French Switzerland and the Simplon Valley will be thrown open to German goods, to the detriment of French commerce, and in case of war Italy and Germany would be enabled to bring troops directly to the Franco-Swiss frontier, which is almost entirely unfortified.—*Heropath's.*

A Misled Dog.

A Western newspaper scribbler has evolved the following libel, and ascribes it to a farmer correspondent, thus oppressing the mild-eyed granger with abuse that he does not deserve. It is bad enough to tell of his actual faults. This effort must have been a result of August weather: "For some weeks past my dog has been in the habit of sicking himself unto the cars as they sped apast my place, and he never harmed no one by so doing, nor never would, as I have known him from a child, being peaceabul and fond of young children and awful from the butcher's shop, or would set up and beg or ask for what he requested at any time. When he would run at the cars he would act savage, but still would never injure the train by word or deed if I had a hundred trains whizzing past my place I know he would not harm any of them by night or day, but what does the fireman on the Manitoba-Madison Pacific Northern Utah Railroad do but urge my dog to a high rate of speed and whistle to him to get him close, and then pelt him with wood or coal, or squirt hot water on him, which he tells me, in a blithe and gay tone, that makes me hot, he does to take the bark of my dog. That is what makes me hait the railroad—and that is not all by a long chock, for yesterday they misled my dog and got him in front of the engine when they pulled her wide open and squashed my dog in a way that hurts the rode, and causes it to be looked at askance by every thinking taxpayer and mother. Why will we submit? And also they have killed one child, as they claim by mistake, for which they paid $150, which is no price at all for a child as children goes, and is almost like finnin' a child in the rode. I say fy on such a rode as that, with its sandwiches, which has just a thin rim of ham around the aige, so's when you lock your teeth into it you get left, and the rode has got your money and your name is Dennis, as we say here. Fy on the whole thing is what I say, and I wish you'd print it for I don't care who knows it."

Maintenance of Way Under Difficulties.

The Missouri River seems determined to bankrupt the Missouri Pacific Railroad, says the St. Louis *Globe-Democrat* The account continues: "The company for the past year has been constantly repairing the roadbed near Dundee. The portion of the roadbed that is exposed to the ravages of the Missouri River is not more than 300 ft. long, and along that distance the management has dumped in over 1,000 carloads of ponderous rocks. The last 17 loads were put in this week, and it was thought that the work of a year was completed in

good style. The watchman was discharged and the order for the trains to run slow revoked, but before the section hands could leave the scene the rip-rapping, consisting of hundreds of tons of rock, disappeared in the river and was covered by 10 ft. of water. The track was moved to the bluff and the work has been begun over again. This section cost the company $30,000 last year."

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

The New York Court of Appeals holds that the statute of 1868, entitled "An act to provide for the transmission of letters, packages and merchandise in the cities of New York and Brooklyn, and across the North and East rivers, by means of pneumatic tubes, to be constructed beneath the surface of the streets and public places in said cities, and under the waters of said rivers," authorizing the formation of a corporation under the manufacturing company laws to carry on the business, is not invalid under Const. art. 3, sec. 16, forbidding the passage of any private or local bill embracing more than one subject, which shall be expressed in its title.[1]

In Minnesota a railroad set apart to a trustee for the holders of "special land stock," for the payment of dividends thereon, land granted under an act of Congress to the road, to aid in its construction. The land, when granted, was exempt from taxation. The company also gave a power of attorney to sell such land for the purpose of paying the dividends. The Supreme Court holds that said land had been "contracted to be sold, conveyed, or leased, by said company," and was therefore subject to taxation.[2]

The Supreme Court of Pennsylvania rules that by the words "railway crossing" in a statute is meant such a crossing only as appropriates no part of the land of the company whose track is to be crossed to the exclusive use of the company seeking to cross.[3]

The Supreme Court of Pennsylvania decides that a New York railway and canal corporation, whose receipts are subject to taxation in Pennsylvania, cannot escape such taxation by sending them to New York.[4]

An Iowa statute of 1888, entitled "An act to regulate railroad corporations," provides "that any such railroad corporation guilty of extortion * * * shall forfeit and pay the state of Iowa not less than $1,000 nor more than $5,000, * * * to be recovered in civil action by ordinary proceedings instituted in thename of the state." The Federal Circuit Court holds that an action for such penalty, brought by the state, is one of a criminal nature, and not removable under act Cong., March 3, 1887, § 2, which provides "that any suit of a civil nature, at law or in equity, may be removed."[5]

The Supreme Court of Idaho rules that the statute which fixes absolute liability on a railroad company to pay for injuries done to domestic animals, when there is no neglect or fault on the part of the owner, when under the general law of the land no one else is so liable under such circumstances, does not furnish the "due process of law" provided for in the constitution of the United States, and is void.[6]

Carriage of Goods and Injuries to Property.

The Supreme Court of Errors of Connecticut holds that under the state statute which requires every railroad thereafter constructed to separate its grade from that of intersecting highways and to pass either under or over the latter, and provides that such railroads must construct and maintain bridges in obedience to the order of the railroad commissioners, but makes no provision for appeal from such order, a city cannot appeal from an order of the railroad commissioners, directing a railroad company to place supports under a bridge across a street in such a city.[7]

In Pennsylvania the Supreme Court rules that the measure of damages where land is taken for a railroad is the difference between the selling value of the tract before and after the taking, and it is proper to consider for what purpose it may be used to advantage, in order to determine for what price it will sell; but evidence showing how many building lots the tract could be divided into, and what such lots would be worth separately, is improper, the only question for the jury being how much the tract in its present condition, as a single tract, will be worth in view of the taking or other injury.[8]

An Ohio statute provides that a municipal corporation may agree with a railroad company as to the terms and conditions on which it may lay its tracks on a street, and that, if unable to agree, the right to use any necessary street may be acquired as if it were private property; but further provides that the owner of property lying on or near to the ground so used may recover for injuries sustained by the construction of the road on the street. The Supreme Court of the United States decides that it authorizes a recovery for damages to land lying on a street intersecting one so taken by a railroad company with the consent of the municipal government, and within 33 ft. of, but not touching, the one on which the track is laid. The obstruction of the streets during the building of the road, whereby access to such property is impaired or suspended, is not an injury to the property, within the statute, from which a cause of action necessarily arises, as the use of the streets is incidental to the improvement, though if the obstruction is unreasonably prolonged the special damages resulting therefrom may be recovered.[9]

Injuries to Passengers, Employees and Strangers.

The Supreme Court of Indiana rules that an attempt to leave a moving train is not negligence *per se*.[10]

In New York a passenger left a train at a station, and attempted to cross one of defendant's tracks, intending to return to the train and resume his journey. While on this track he was struck by a passing train, which was running at a speed forbidden by defendant's rules. Persons going to and from the trains were accustomed to pass where he was struck. When he attempted to cross the track, escaping steam from the engine of his train prevented him from hearing the approaching train. For a few moments before he turned to cross the track he had walked towards the approaching train, but, owing to obstructions, was unable to see it. If he had looked at the instant he stepped on the track he could probably have seen the train. The Court of Appeals decides that the passenger was not negligent, and the railroad is liable.[11]

In Indiana the Supreme Court rules that, in an action for injuries by being ejected from a train with unnecessary force, the question of contributory negligence does not enter into the case, as it is no defense against an intentional wrong.[12]

In the same state the Supreme Court holds that the purchaser of a round-trip ticket, one-half of which is intended as a return ticket, can ride from the terminal station to the station at which the trip begins, though he refuses to surrender the first half on demand made by the conductor in accordance with a rule of the company, unknown to the passenger or to the public generally, requiring conductors to take up the whole of such tickets when tendered as fare from the return station or collect full fare, and, if ejected from the train, may recover damages.[13]

In Indiana a section hand was directed, along with others with whom he was working, by a special order, to go to a certain place and repair a portion of the defendant's track; while proceeding to the place on a hand-car, they were met near a curve by an extra train, running at a high rate of speed, of which no notice had been sent out, and whose approach was not indicated by any signals, and a collision resulted, in which he was injured. The Supreme Court rules that as he had been assigned to a special duty by a special order, the danger resulting from the running of the extra train in the manner alleged was not one of the ordinary risks of the service which he assumed. But where it appeared that the defendant had promulgated rules requiring section hands to be at all times prepared for irregular trains, and it further appeared that the collision occured at a point beyond the place designated in the special order, he could not complain that notice had not been given of the extra.[14]

In New York the Supreme Court holds that where it is shown that it had been the custom of defendant for several years to order its track repairers to assist in removing wrecks in emergencies, and that plaintiff, a track repairer, had several times been so employed, he cannot insist, in an action for injuries received while assisting in removing a wreck, that such work was not part of his duty, and that he did not, therefore, assume the risk incident to it.[15] In this case the plaintiff, employed as a track repairer, was one of a gang of workmen called from various branches of defendant's service to remove a wreck. By order of the boss he was assisting at a derrick, the handle of which flew back and struck him. The accident was caused by the negligence of another employé a switchman, who was ordered by the station master to operate the brake. The Supreme Court rules that plaintiff and the man at the brake were fellow-servants, and defendant was not liable.[16]

In another case in New York the Supreme Court rules that a servant cannot recover of the master for negligence in employing a foreman addicted to intoxication, where there is no evidence that his habits rendered him unfit for the duties of his position when sober, and no evidence of intoxication on the day the injuries were complained of were sustained, but the evidence is that he was sober on that day.[17]

In New York, a woman was riding alone toward a railroad crossing, and, according to her testimony, she looked both ways for trains, and seeing none, rode on and was struck by a hand car, and injured. The foreman in charge of the car testified that he saw her at some distance and she was apparently looking at the car; that he might have stopped the car; and that it was moving at about five miles per hour. The view of the track from the road was somewhat obstructed. The Supreme Court holds that the questions of the negligence of defendant's servants and of plaintiff's contributory negligence were for the jury.[18]

In Minnesota, the plaintiff approached a railroad crossing, having a clear view of the track for a mile, except for a coal shed and some box cars. The mules he was driving were quiet and not afraid of the cars. Plaintiff looked, but did not see an approaching train, nor hear the whistle which was blown. At the place where he testified he looked for the train there was no obstacle. After he passed the coal shed and box cars he was within 22 ft. of the track, but did not see the train, and was run over. The Supreme Court holds that he was negligent and cannot recover damages.[19]

In Georgia the plaintiff's husband, after drinking whisky, walked along a railroad track on a dark night, and when more than 400 yards from the crossing where he started he was struck and killed by a train moving at a considerable rate of speed. There was evidence that no signals were given when approaching the crossing, and the only evidence to the contrary was that of the conductor, who stated that he did not remember positively, but thought the whistle was blown, as such was the invariable rule. One witness, who was standing near the track, testified that he saw lights on the train, but thought he could not see the head-light. He also testified that deceased had good sight and hearing, but would sometimes get into a study and not notice anything. The conductor testified that the head-light was burning shortly before and shortly after the accident, but he was not sure about it at the time of the accident. The Supreme Court rules that deceased was negligent and plaintiff could not recover.[20]

1 Astor v N. Y. A. Co., 20 N. R. E. Rep., 594.
2 St. Paul & S. C. R. Co. v. Shanks, 42 N. W. Rep., 83.
3 re Sharon Railway, 17 Atl. Rep, 234.
4 D. & H. C. Co. v. Com., 17 Atl. Rep., 175.
5 State v. C., B. & Q. R. Co., 37 Fed. Ref., 497.
6 Cattrell v. U. P. R. Co., 21 Pac. Rep., 416.
7 City of Waterbury's appeal, 17 Atl. Rep., 355.
8 Penn. S. V. R. Co. v. Cleary, 17 Atl. Rep., 468.
9 Shepherd v. B. & O. R. Co., 9 Sup. Ct. Rep., 598.
10 L. & N. R. Co. v. Crunk, 21 N. E. Rep., 31.
11 Parsons v. N. Y. C. & H. R. R. Co., 21 N. E. Rep., 145.
12 C., St. L. & P. R. Co. v. Bills, 20 N. E. Rep., 775.
13 C., St. L. & P. R. Co. v. Holdridge, Jr., 20 N. E. Rep., 837.
14 C. I., St. L. & C. R. Co., v. Lang, 21 N. E. Rep., 317.
15 Slattery v. N. Y., L. E. & W. R. Co., 4 N. Y. (Supp.), 910.
16 Ibid.
17 Harrington v. N. Y. C. & H. R. Co., 4 N. Y. (Supp.), 640.
18 Boll v. Adirondack R. Co., 4 N. Y. (Supp.), 769.
19 Weyl v. C. M., St. P. R. Co., 42 N. W. Rep., 24.
20 Wilds v. B & R. Co., 9 S. E. Rep., 595.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Albany, quarterly, $2 per share, payable Sept. 30.

Chicago, Burlington & Quincy, quarterly, 1 per cent., payable Sept. 16.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Central Counties, special meeting, Ottawa, Can., Sept. 10.

Minneapolis, St. Paul & Sault Ste. Marie, annual meeting, Minneapolis, Minn., Sept. 17.

Ohio, Indiana & Western, annual meeting, Indianapolis, Ind., Sept. 11.

Oregon Transcontinental Co., special meeting, Portland, Or., Nov. 5, to take action on the question, which has already been submitted to the directors, whether the capital of the company shall be reduced or the company shall be liquidated and go out of existence.

Terminal Railroad Association of St. Louis, special meeting, St. Louis, Mo., Oct. 1.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its seventh annual convention at Denver, Colo., Sept. 10.

The *Master Car and Locomotive Painters' Association* will hold its twentieth annual convention in Chicago Sept. 11. The headquarters are at the Tremont Hotel.

The *American Association of General Passenger and Ticket Agents* will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.

The *New England Railroad Club* meets at its rooms in the United States Botel, Beach street, Boston, on the second Wednesday of each month, except June, July and August. The next meeting will be held Sept. 11.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p.m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at the Club rooms, No. 24 West Fourth street, Cincinnati, at 8 p. m., on the fourth Thursday of each month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Society of Civil Engineers.

The following papers and discussions are announced:

Meeting of Sept. 4, 1889—Paper on The Sibley Bridge, by O. Chanute, John F. Wallace and William Breitbaupt, members Am. Soc. C. E., with discussion.

Meeting of Sept. 18, 1889—Discussion on paper by Theodore Cooper, M. Am. Soc. C. E., on American Railroad Bridges.

Meeting of Oct. 2, 1889—Paper on The Hydraulics of Fire Streams, by John R. Freeman, M. Am. Soc. C. E., with discussion.

Meeting of Oct. 16, 1889—Paper on Cast Iron: Strength, Resilience, Tests and Specifications, by John B. Johnson, M. Am. Soc. C. E., with discussion.

Discussion on these papers is invited. Advance proofs will be sent to those expressing a desire to discuss either paper. Papers on engineering subjects are invited. They should be presented as early as possible so as to arrange for their presentation and discussion. JOHN BOGART, Secretary,
127 East Twenty-third street, New York.

New England Railroad Club.

The regular monthly meeting of the club will be held on Wednesday, Sept. 11, 1889, at the United States Hotel, Boston. Members are invited to bring their ladies. The committee has arranged for a reception at 6 and dinner at 6.30 p. m. The subject for discussion is an elaborate bill of fare, after which there will be remarks by distinguished guests. Tickets to be had of the secretary at $2 each. No wines or liquors served.

Northwest Railroad Club.

The next meeting of this club will be held on Saturday, Sept. 7, at the Union Depot, St. Paul. The subject for discusson is "Wheels," and will be introduced by A. F. Priest, Master Mechanic of the Eastern of Minnesota.

PERSONAL.

— Mr. W. W. Worthington, General Superintendent of the Fort Wayne, Cincinnati & Louisville, has resigned.

—Mr. E. W. White, Superintendent of the United States Rolling Stock Co.'s shops at New Decatur, Ala., has resigned.

—Mr. W. J. Haylow, Trainmaster of the Louisville and Nashville, at Montgomery, has resigned to become Assistant to the General Manager of the Alabama Midland.

— Mr. L. B. Paxson, Superintendent of Motive Power of the Philadelphia & Reading, was badly injured by a fall about a fortnight ago and is still confined to his bed, but is now in a fair way to recovery.

—Mr. P. J. Cochrane, the retiring Master of Machinery of the South Carolina Railway shops at Charleston, S. C., was presented by the employés last week with an elegant silver service and other gifts aggregating $800.

— Mr. A. C. Armstrong, Purchasing Agent of the Atchison, Topeka & Santa Fe system, has resigned. His successor will be William G Fuller, whose appointment was agreed upon by the new board of directors at the recent meeting in Boston.

—The headquarters of Mr. R. L. Ettinger, the Superintendent of Motive Power of the American Midland, are at West Park, Findlay, O. Mr. Ettinger was lately Mechanical Engineer in the Chesapeake & Ohio shops at Richmond, Va. He is a brother of G. W. Ettinger, of the Iron Car Co.

—Mr. A. L. Mohler, who has just been appointed General Manager of the St. Paul, Minneapolis & Manitoba, has been on the road seven years, having been General Freight Agent and Land Commissioner. He began his railroad service 20 years ago on the Chicago & Northwestern, and has been clerk, station agent and traveling auditor.

—Mr. P. P. Shelby, who has just been appointed Assistant General Traffic Manager of the St. Paul, Minneapolis & Manitoba, has been connected with the system two years, having begun on the Montana Central. He began his railroad service on the Union Pacific in 1866, and worked his way up from trainman to General Freight Agent. He was in the traffic department of that road 12 years.

—General Manager Jeffery, of the Illinois Central, resigned peremptorily on Wednesday last. His general resignation has been for some time in the hands of President Fish, who is now in Europe. Vice-President Harriman overruled Mr. Jeffery's decisions as to changes in rates, and Mr. Jeffery at

once gave up his position. General Superintendent C. A. Beck takes Mr. Jeffery's place till a new appointment is made. Mr. Jeffery was born in England in 1843, and his entire railroad service has been on the Illinois Central, where he began in 1856 as office boy. He held various positions in the mechanical department until 1871, when he was made Assistant Superintendent of Machinery. He has been General Manager four years.

— Judge Wheelock G. Veazey, of Rutland, Vt., has been appointed by the President an Inter-state Commerce Commissioner in place of Aldace F. Walker. Western men have been urging upon the President the appointment of some one from their section, but the President thought the claims of Vermont and New England were paramount, and that the successor to Judge Walker should be from the same state. New England papers and citizens naturally speak well of the appointment. Judge Veazey is reported to be a man of ability, is a prominent Grand Army man, and thus is acceptable in every way to the party in power. He has interested himself in railroad matters in Vermont for many years, principally from the legal point of view. Judge Veazey was born in New Hampshire, was graduated from Dartmouth College in 1859, and studied law under Senator Marston, of that state. Removing to Vermont, he was selected five times by the legislature for the supreme bench of that state, and ranks high as a judge. He was, with Secretary Proctor, a colonel in Stannard's brigade at Gettysburg, and has a good army record.

ELECTIONS AND APPOINTMENTS.

Alabama Midland.—Mr. Bradford Dunham has been appointed Superintendent.

Baltimore & Ohio.—In accordance with the new plan of organization the title of Mr. W. N. Bolling is changed to Real Estate Agent, lines east of Ohio River. Mr. T. J. Frazier has been appointed Real Estate Agent for the lines west of the Ohio River.

Canada & St. Louis.—The new owners of this road have appointed as their agent William K. Akerman, whose headquarters are at Battle Creek, Mich.

Cape Fear & Yadkin Valley.—H. L. Fry has been appointed Chief Engineer in place of Maj. R. P. Atkinson, deceased.

Chesapeake & Ohio.—W. J. Harahan has been appointed Engineer of Maintenance of Way of the Cincinnati Division, in place of H. Pierce.

Cincinnati, Sandusky & Cleveland —E. G. Barnhart has been appointed General Freight Agent. Office at Columbus, O.

Columbus, Hocking Valley & Toledo.—The control of the road has passed into the hands of the interest opposed to the Shaw management, and John W. Shaw has resigned the offices of President and Director. He was at once succeeded by C C. Waite, formerly General Manager of the Cincinnati, Hamilton & Dayton.

Geneva & Sayre —The directors of this reorganized company are: Geo. M. Niven, Elmira, N. Y.; William Stevenson, Sayre, N. Y.; Howard Elmer, Waverly, N. Y.; Alexander S. Niven, Charles J. Langdon, Daniel R. Pratt, Eugene Niven, Elmira, N. Y.; Franklin C. Cornell, David B. Stewart, Ithaca, N. Y., William Falck, Antoine Romer and Chas. H. Knipp, Elmira, N. Y.

Georgia Southern & Florida.—J. Lane, General Manager, announces that S. C. Hoge has been appointed Superintendent.

Gulf, Colorado & Santa Fe.—J. M. Phillips having resigned, H. R. Irvine has been appointed Division Superintendent of the northern division, with office at Cleburne, Tex.

Illinois Central.—Acting President Harriman, consequent upon the sudden retirement of E. T. Jeffrey from the management, has made A. W. Sullivan Acting General Superintendent of the system, vice C. A. Beck, promoted to be Acting General Manager. E. G. Russell, Superintendent of the Wisconsin Division, was made Superintendent also of the Illinois lines to fill Mr. Sullivan's place.

Lake Shore (New Hampshire).—At the annual meeting at Laconia, N. H., Sept. 2, the following directors were elected: C. A. Busiel, John Kimball, F. N. Rollins, Stilson Hutchins, Amos Rollins, Hiram Hill and J. S. Crane. The directors organized by electing C. A. Busiel President; F. S. Streeter, Clerk. The road will be completed in a few weeks.

Louisville & Nashville.—Clifton P. Rowland, a son of D. W. C. Rowland, has been made Roadmaster of the Louisville, Cincinnati & Lexington division; office at Louisville, Ky.

Marion & Indianapolis.—The stockholders at a meeting in Marion, Ind., last week, elected the following directors for the coming year: G. N. Winchel, G. A. Henry, W. C. Webster, David Overman, M. F. Tingley, Jas. Brownlee, Cyrus Gibson, Jonathan W. Parson and William Garner.

Montana Central.—B. H. Langley has been appointed General Freight and Ticket Agent, with headquarters at Helena, Mont.

Monterey & Mexican Gulf.—The present officers of this road are: Thomas S. Bullock, Vice-President; V. A. Wilder, Secretary and Treasurer, New York City; J. A. Robertson, General Manager; Wm. H. Wentworth, Chief Engineer; John Grace, Master of Transportation; J. D. Coplan, General Traffic and Passenger Agent; W. H. Davis, Auditor, Monterey, Mex.

New Orleans, Natchez & Fort Scott.—W. Dunbar Jenkins, of Kansas City, has been chosen as Chief Engineer, in place of Captain A. B. Wingate.

New York Central & Hudson River.—John Carstensen has been appointed Controller, in place of Isaac P. Chambers, deceased, and George S. Prince, Assistant Treasurer, in place of John Carstensen. T. W. Burrows has been appointed Assistant Superintendent of the Western Division.

New York, Pennsylvania & Ohio.—T. W. Burrows, recently of the Chicago & Atlantic, has been appointed Superintendent of the Mahoning Division.

Ohio Valley.—W. W. Hegemann has been appointed Superintendent, with office at Evansville, Ind.

Penobscot Central.—At the annual meeting in Bangor, Me., last week, the following directors were elected for the ensuing year: John H. Higgins, of New York; John Morrison, C. E. Edmunds and J. B. Wheeler, of Corinth; Wm. T. Pearson and Matthew Lincoln, of Bangor; T. J. Peakes, W. E. Dunning and Geo. D. Cook, of Charleston; T. P. Batchelder, of Kenduskeag; and S. G. Jerrard, of Levant. A. M. Devereux was elected an associate incorporator,

Richmond, Nicholasville, Irvine & Beattyville.—C. D. Chenault, of Richmond, Ky., has been elected Vice-President.

Rome, Watertown & Ogdensburg.—Acting General Manager E. S. Bowen has been made General Manager in place of H. M. Britton, deceased.

St. Paul, Minneapolis & Manitoba.—A. L. Mohler has been appointed General Manager in place of Allen Manvel, resigned, to accept the presidency of the Atchison, Topeka & Santa Fe. P. P. Shelby has been appointed Assistant General Traffic Manager with office at St. Paul.

San Francisco & North Pacific.—W. H. Menton has been appointed Assistant General Passenger and Freight Agent, with headquarters at San Francisco.

San Francisco, Tamalpais & Bolinas.—The directors of this new California road are: Harry L. Coleman, Frank P. Bacon, of Oakland; Thomas Brown, Charles Page and William F. Russell, of San Francisco.

Shawnee & Muskingum River.—E. C. Winstanley, recently General Manager of the Zanesville & Ohio River, has been chosen President and General Manager of this road.

Texarkana & Fort Smith.—The stockholders at Little Rock, Ark., Aug. 29, met and elected the following directors: W. L. Whitaker, A. L. Ghio, W. Behan, J. H. Smelser, B. T. Estes, W. Buchanan, L. A. Byrne, of Texarkana; A. J. Tullock, of Leavenworth; H. C. Moores, of Fort Scott, and W. C. Clapton, of New York.

Vincennes, Oakland City & Owensboro.—The stockholders have elected directors as follows: C. W. Bransford, Edward Watson, W. N. Cockrum, C. Pelza, A. K. Powers, J. C. Haines, S. N. Chambers, J. B. Cockrum, W. A. Oliphant. The directors elected the following officers: Edward Watson, President; J. C. Haines, Vice-President; C. W. Bransford, Secretary; W. A. Oliphant, Treasurer; J. B. Cockrum, General Solicitor.

Walterboro & Yemassee.—The officers of this South Carolina company are: R. C. Barkley, President; A. Wichman, Vice-President; J. S. Silver, W. P. Murphy, J. R. Stokes, Wm. Gregg, directors, and A. S. Farrow, Secretary. Office at Walterboro, S. C.

OLD AND NEW ROADS.

Arkansas & Gulf.—The line of this road, which was chartered a year ago to build a railroad from a point in Chicot County, Ark., via Arkansas City to a point on the Kansas City, Fort Scott & Memphis road in Fulton County, Ark., is to be surveyed at once. The length of the line is about 275 miles, and the capital stock mentioned in the charter $2,750,000. The officers say that the company will have the road completed by next spring. The right of way is now being negotiated for.

Arkansas & Louisiana.—The new management of this road proposes to extend the line from Nashville, Ark., west to a point on the Missouri, Kansas & Texas road in the Indian Territory, some 125 miles. The company, which operates 27 miles from Hope to Nashville, has just been taken out of a receiver's hands.

Augusta & West Florida.—This company has been incorporated in Georgia to build a railroad from Augusta southwest to Thomasville, Ga., over 200 miles. The incorporators are: W. N. Mercier, Jesse Thompson, J. D. Verdery, F. B. Pope and G. Rhind, of Augusta; A. T. McIntyre and A. P. Wright, Thomasville; T. C. Hogan, T. B. Green and C. E. Smith, of Washington; James M. Smith, of Oglethorpe, and T. J. Dempsey, of Jackson.

Brantford, Waterloo & Lake Erie.—A general meeting of the shareholders of this company will be held at Brantford, Ont., Oct. 1, for the purpose of sanctioning the issue of bonds to the amount of $20,000 per mile. This company was chartered in 1887 to construct a road from Brantford to Hagarsville or Waterford, or some intermediate point on the line of the Canada Southern, for which Parliament voted $3,200 per mile on the total length of the line, 18 miles, work to be completed by Aug. 1, 1891. The directors of this company deny that they have sold out to the Michigan Central, as has been currently reported, although it is admitted that there have been negotiations in that direction.

California & Nevada.—Grant Brothers have received a contract for grading eight miles on this California road, which runs from Oakland eastward. The extension is to open communication with the Moraga ranch, and work will be begun at once.

Canadian Pacific.—The gross earnings of the company for July were $1,375,528, and the working expenses $771,480; leaving net profits of $604,048, as compared with $401,028 for July, 1888. The gross earnings from Jan. 1 to July 31 were $7,745,022, and the working expenses $5,163,552; leaving net profits of $2,581,470, as compared with net profits of $1,006,571 for the same period last year.

Chicago, Burlington & Quincy.—The statement for July shows gross earnings, including the Burlington & Missouri River, of $2,088,150, an increase of $224,649 over July of last year. Expenses decreased $325,498, making the net earnings $903,455.

The gross earnings for the first seven months of the year are $14,050,927, an increase of $2,211,461. Net earnings were $4,725,708, an increase of $3,078,971. Expenses during the seven months decreased $867,510. Other properties controlled by the Burlington show for seven months an increase in gross earnings of $946,353, and an increase in net earnings of $686,016.

Cincinnati & Bedford.—Organized in Indiana to build a line from the Ohio & Mississippi to the Louisville, New Albany & Chicago. John H. Barnard, of Cincinnati, is at the head of the enterprise.

Chicago, Milwaukee & St. Paul.—The proposed extension of the Dakota Division from Chamberlin, Dak., across the Sioux reservation to Rapid City, Dak., is said to be now under survey. The distance between the two points is about 200 miles.

Chicago, Rock Island & Pacific.—The Omaha, Hutchinson & Gulf road has been completed between Hutchinson and Kingman, Kan., 30 miles, and regular trains will shortly begin running.

Choctaw Coal & Railway Co.—This railroad line, which has been under consideration for a year or two for the purpose of developing coal lands near McAllister, I. T., is soon to be put under construction, the contract for grading a section having been let to Garvey & Bro., of Memphis, Tenn. The last reports about the route indicate that the line would be run to a connection with the Atchison, Topeka & Santa Fe, in the Oklahoma country.

Coudersport & Port Allegany.—It is reported that this road, which extends eastward from Port Allegany, Pa., on the Western New York & Pennsylvania to Coudersport, 17 miles, is to be extended about 35 miles further east to Ansonia, Pa., on the Fall Brook coal company's road, thus making a line from Buffalo and Olean to points on the last-named road much shorter than the present route. The Coudersport & Port Allegany has done a very prosperous local business since its opening in 1882. The gauge of the road has been made standard.

Denver & Rio Grande.—The line from Villa Grove, Col., eastward to Mount Vista is said to be under survey.

Evansville & Richmond.—This road, which is under construction from Elnora, Ind., on the Evansville & Terre Haute, eastward to Seymour, Ind., about 70 miles, is substantially completed, and will be opened for business very soon. The exact location of the line east of Seymour has not yet been decided upon. The road is built in the interest of the Evansville & Terre Haute.

Fairchild & Mississippi River.—This road, formerly the Sault Ste. Marie & Southwestern, now in operation from Fairchild, Wis., on the Chicago, St. Paul, Minneapolis & Omaha, westward about 15 miles to Osseo, is to be extended southwest to the Mississippi River, about 40 miles further, and tracklaying will soon begin on the first 22 miles, to Mondovi, on the Buffalo River.

Fairhaven & Southern.—The work of constructing the line of this road from Fairhaven, near Whatcom, Wash., northward about 40 miles to New Westminster, B. C., has been actively begun. The contract from New Westminster to the Nicomickel River, in British Columbia, has been let to Mr. Leamy, and the work of clearing and grading is nearly completed on this section. The clearing is done to the American boundary line. On the line south from Fairhaven the grading and clearing is nearly completed to Sedro, on the Skagit River, 26 miles, and the bridging and tracklaying is being pushed forward steadily. The road is standard gauge and well built, and the grades and curvatures are moderate.

Flint & Pere Marquette.—The gauge of the Port Huron & Northwestern, which is now owned by this company, has been changed from 3 ft. to standard, from East Saginaw eastward to Yale, Mich., 66 miles, and the remainder of the line to Port Huron, 25 miles further, is to be changed within a month or two.

Georgia.—Bills have been introduced in the Georgia legislature to incorporate the following railroad companies: The Southeastern, from Fort Valley via Cordele to Brunswick, with a capital stock of $500,000; the Alabama, Georgia & Florida; the Macon, La Grange & Birmingham; the Ocean Pond & St. Mary's Short Line; the Americus & Jacksonville.

Henderson State Line.—Henderson and Hebbardsville precincts last Monday voted $88,000 to this Kentucky road.

Knoxville, Cumberland Gap & Louisville.—The line through the Cumberland Gap tunnel, connecting with the Cumberland Valley branch of the Louisville & Nashville, is now open for traffic.

Indianapolis, Decatur & Western.—Benjamin A. Sands, the plaintiff in the suit at Indianapolis, Ind., for the appointment of a receiver, has withdrawn his petition, the apparent purpose being to take the case out of the hands of Judge Gresham, who recently issued a peremptory order discharging a receiver who had been appointed by the District Court. A few hours after the withdrawal the case was filed in the state courts in Marion County. In the complaint the averment is made that the company is insolvent, and as the claims against it are junior to the first mortgage, it is important that the court should order the filing of all claims, so that the equity of them can be passed upon. They want the first mortgage decreed a lien on the property and the plaintiff protected in the possession of it pending litigation.

Lookout Mountain.—The Chattanooga *Times* reports that the Lookout Mountain standard gauge road will build a line of its own from a point 500 yards above the present junction to Forest Hills Cemetery, thence in a straight line to Cravens, where the Nashville, Chattanooga & St. Louis tracks will be reached and used for running into the city. The new line will shorten the distance to the mountain and enable the company, to run trains in 40 minutes from the Union Depot to the new hotel.

Marion & Indianapolis.—It is stated that parties who can command capital have expressed a willingness to aid the projectors of this long-talked-of road, providing the friends of the enterprise will take hold of the matter in earnest and see what can be done in the way of subsidies and the right of way into the city of Indianapolis. The projectors of this enterprise, for some years, had an option on the canal bank, from Broad Ripple to Ohio street, in the heart of Indianapolis, but it was allowed to go by default. It is stated, however, that assurance has been given the projectors that, on favorable terms, they can still secure it for a track. The line, as originally surveyed, and the one which will probably be adopted, is of very easy grade, with few curves and few streams of importance to cross.

Memphis & Raleigh.—This suburban road, noted in our issue of Aug. 2, is projected to extend from Memphis, Tenn., northeast 10 miles to Raleigh. It is stated that it will be laid with 56-lb. rails and provided with first-class equipment generally. It is said that work on the line is to be begun without delay.

Mexican Southern.—The contracts for the grading and masonry on this road, from Puebla to Tehuacan, 78 miles, have been awarded, and the work already begun. The estimates for the heavier work beyond Tehuacan are now under consideration. Bids for work between the last-mentioned town and Tecomaraca will be received in about a month. Particulars can be had from the office of the contractors, Messrs. Read & Campbell, in the City of Mexico.

Mobile & Ohio.—Judge Barrett, of the New York Supreme Court, has granted an injunction restraining the company from paying the interest Sept. 5 on its general mortgage bonds, and from pledging or selling any of its bonds for the purpose of providing for the payment of interest.

Monterey & Mexican Gulf.—The construction of this Mexican road, projected to extend from Monterey, about 150 miles south of Laredo, Tex., southward to Tampico, on the Gulf of Mexico, 325 miles, is progressing rapidly, and the grading is completed for 81 miles from Monterey. The road is in operation to Montemorelos, 60 miles, and track is laid five miles further. The contractors are McGavock, Price & Co., and the locating survey is completed for 100 miles beyond the present end of the track. The names of the officers are given in another column.

Monterey & Northwestern.—This Mexican road, which is projected to extend from Monterey, in the state of Nuevo Leon, northwestward, has been located for 65 miles northwest of Monterey. Work upon this portion of the road will be begun at once, and its completion is expected by

January next. This section extends to Venadito, on the Mexican International, and will serve to connect the Monterey & Mexican Gulf with the standard gauge railroad system of Mexico and the United States. The New York office of this company is identical with that of the Monterey & Mexican Gulf, which is at 42 Wall street.

Newark & Roselle.—Articles of incorporation have been filed in New Jersey. The road is to be between six and seven miles long, and will constitute a link in the route of the Lehigh Valley line to New York. The incorporators are: John Hood, of Camden; David G. Baird, of Beverly; James R. English and N. C. J. English, of Elizabeth; Henry S. Drinker, of Philadelphia, and Henry E. Yarnell and Joseph F. Schapperknap, of Pennsylvania.

New Westminster & Southern.—Advices from British Columbia state that the difficulty of obtaining men to go on with the construction of this road has been overcome, and that work is now going ahead rapidly.

Nicholasville & Lancaster.—Organized in Kentucky to build a railroad from Nicholasville south to Lancaster, about twenty miles. The proposed line is along Big Hickman Creek and up Coopers Branch, the Kentucky River being crossed near Boone's Knot. Nicholasville is on the Cincinnati Southern and Lancaster is on the Kentucky Central.

Northern Pacific.—The extension of the Cascade & Northern, from Palmer, Wash., to the Denny iron mines and the Kirk coal mines is now under construction for about 5 miles. The distance to the Denny mine is about 18 miles.

North St. Paul.—A company by this name has been incorporated to build a line from St. Paul, Minn., northeastward to a point on White Bear Lake, about 8 miles. James W. Jones, of St. Paul, is one of the incorporators.

Ohio Valley.—The company has filed in Vanderburg County, Ind., a mortgage to secure bonds issued by the company. The mortgage is for $1,470,000, and it covers all of the franchises and property of the company.

Oregon Railway & Navigation Co.—The Pleasant Valley Branch is now in operation between Winona Junction and Seltice, Wash. The line crosses the Northern Pacific at Oakesdale.

Oxford & New Glasgow.—This Nova Scotia road, which is being built by the Canadian government, from a connection with the Intercolonial east of Amherst, through the principal towns along the shore of Northumberland Strait, to Pictou, is now under construction for the whole distance, and it is expected to complete the road during the present year. The length of the line from Oxford Junction to Pictou is 68 miles, and there is a branch to Pugwash, four miles. The contractors for the ballasting and tracklaying are Gray, McManus, Trites & Co., of Moncton, N. B., and the engineer in charge is R. H. Cushing. The line runs through Wallace, Tatamagouche, River John, Poplar Hill and Scotsburn.

Penobscot Central.—The towns along the line of this proposed road have subscribed $32,000 to the stock. Fifty thousand dollars is needed before beginning the construction, and the directors are confident that they can secure the balance of $18,000 without delay. The route from Bangor to Milo will be through the towns of Glenburn, Kenduskeag, Corinth, Charleston and Atkinson. The stockholders have ratified a lease to the Castine Railway and Navigation Company.

Phillips & Rangeley.—It is stated that funds have been secured for the construction of this road and that work will be begun at an early date. The line extends from Phillips, Me., the western terminus of the 2 ft. gauge Sandy River road, westward to the Rangeley Lakes.

Pittsburgh, Cincinnati & St. Louis.—The company has defaulted payment of $146,422 interest on Little Miami and Columbus & Xenia stocks and Columbus & Xenia bonds. The Little Miami has made a demand on the Pennsylvania Railroad Company, which guaranteed the fulfillment of the Pittsburgh, Cincinnati & St. Louis's lease of the former, for payment of the amount forthwith. The lessee company claims that the Little Miami has defaulted in the matter of betterments to the property.

It is said that a plan is under consideration for extending the 10-mile New Cumberland Branch, which leaves the main line two miles east of the Steubenville bridge, northward to Chester, W. Va., opposite East Liverpool, O. The line is now being surveyed.

Ravenswood, Spencer & Glenville.—It is reported that contracts will soon be let for work on this road, between Spencer and Ravenswood, W. Va.

Red River, Sabine & Western.—Clearing up the right of way on the line of this road has been begun at Palestine, Tex., and the forces will work east toward Rusk and New Birmingham. Grading will be begun here at once.

Richmond, Nicholasville, Irvine & Beattyville.—L. F. Mann, of Richmond, Ky., has been awarded the contract for doing the grading and building the tunnels and trestles on four miles of the line, from Beattyville to Contrary Creek, Ky.

St. Louis & Chicago.—The sale of the road, which was to have taken place Sept. 4, has been postponed until Oct. 4, under the direction of the complainants' solicitors, and also in accord with the wishes of the bondholders' committee. The delay is for the purpose of giving the second-mortgage bondholders an opportunity to buy in the property.

San Francisco, Tamalpais & Bolinas.—A company by this name has been incorporated in California to build two short lines northward from Sausalito, which is the southern terminus of the North Pacific Coast road, six miles across the bay northwestward from San Francisco. One line is to extend to the base of Mount Tamalpais and the other to Bolinas Bay. Each is about ten miles long.

Seattle, Lake Shore & Eastern.—The people of Davenport, Wash., make an offer to grade the 5 miles necessary to extend the Spokane branch to that town.

Silver City, Pinos Altos & Mongallon.—Articles of incorporation have been filed in New Mexico. The line is designed to connect Pinos Altos, the Gila River section and Cooney's Camp with Silver City. The incorporators are: W. H. Newcomb, H. H Betts, Benjamin Harrison, T. Stephens and John A. Miller, of Silver City.

Tennessee & Coosa.—This projected railroad, on which considerable work was done last year, and which is projected to extend from Gadsden, Ala., north by west to Huntsville, Ala., is now said to have passed into the hands of parties who will build the unfinished portion from Atalla to Huntsville, which is about 85 miles long.

Walterboro & Yemassee.—This new company was organized at Walterboro, S. C., Aug. 27, and a call ordered for 10 per cent. payment on subscriptions within 30 days. The proposed line connects Walterboro with Yemassee at the junction of the Charleston & Savannah and the Port Royal line of the Central of Georgia, about 20 miles southwest of Walterboro. The latter place already has connection with the Charleston & Savannah by the Green Pond, Walterboro & Branchville road.

Washington Hot Springs Co.—The company by this name incorporated in Washington Territory to develop the Green River hot springs includes in its charter a provision for building a railroad from the springs to Franklin. The capital stock of the company is $250,000, and the trustees are: I. G. McCain, A. S. Farquarar, J. P. Judsen and S. T. Packard.

Washington & Jasper.—This company has been incorporated in Indiana. The projected line will run from Washington, on the Ohio & Mississippi, to Jasper, on the Lake Erie & Western, a distance of 30 miles. The capital stock is $500,000.

West Range.—A company by this name has been incorporated in Wisconsin to build a railroad from a point on the Wisconsin Central near Penokee, Ashland County, to Bladder Lake, a distance of 7 miles. The incorporators are J. J. Fish, S. A. Cook, A. D. Eldredge, William Leatoft and F. F. Russell.

Yadkin.—This road will receive $100,000 aid from Stanley County, N. C.

Yazoo Delta Central.—This company was incorporated at the last session of the Mississippi Legislature, with Geo. W. Faison, G. K. Smith, Judge J. Y. Walton and Thos. J. Lee, of Sunflower County, and Hon. Jno. Clark, of Coahoma County, as incorporators. The proposed line is to run from Yazoo City, Miss., to Clarksdale, in Coahoma County, passing near or through the towns of Johnsonville, Indianola or Faisonia, and keeping parallel with the Sunflower River for about 60 miles. The company also has the right to extend the road from Yazoo City to Vicksburg, and may extend from Clarksdale to a point on the Mississippi River, opposite Helena, Ark.

TRAFFIC.

Traffic Notes.

A special train of 25 cars, loaded with hardware, recently left Chicago via the Wisconsin Central and Northern Pacific for Spokane Falls, Wash. The consignment consists of a new stock to replace losses in the recent fire.

The Trans-Missouri Association, which has been laboring in vain to equalize rates in its territory, finally agreed to disagree. The whole matter was, by vote, left to Chairman Walker, of the Inter-state Commerce Railway Association for arbitration.

The rush of passenger travel incident to the close of summer is widespread, as usual. It is stated on the authority of an official of the Pennsylvania that the through trains on the Pittsburgh, Ft. Wayne & Chicago average 11,000 passengers daily. The roads are pushed to accommodate the travel.

The Chicago, St. Paul & Kansas City has given the necessary 10 days' notice of its intention to make the same rates from Duluth to Southwestern Missouri River points as are made from Chicago. It will be remembered that this question was recently arbitrated by Chairman Walker, of the Inter-state Commerce Railway Association, adversely to this road.

The Fitchburg has given notice of a one-dollar reduction in its passenger fares to Chicago via the Erie and Boston line, making the first-class rate from Boston to Chicago $19; and $2 reduction via its West Shore route, making the rate $20 by this route from Boston to Chicago. The Fitchburg thus takes the differentials it has so long been claiming of $3 via the Erie and $2 by the West Shore route.

The war between the coasting tramp steamers on the Pacific and the Pacific Coast Steamship Co. goes on swimmingly and with no prospect for immediate cessation. There has been no further reduction in freight rates, but a boat belonging to Meherin Brothers has made a passenger rate of $10 from San Diego to San Francisco. This will probably be immediately met by the Pacific Coast boats, even though it is impossible for the "tramps," owing to lack of accommodations, to cut into the regular coast passenger traffic to any appreciable extent.

As a result of the passenger rate war between the Pennsylvania, the Monon and the Big Four roads, a round rate trip of $7 has been established between Chicago and Louisville and Chicago and Cincinnati. This is $2 less than the regular one-way rate, but officials of the Louisville, New Albany & Chicago say that the war affects only the through passenger business, and covers only 13 per cent. of that road's business. One of the features of this war is that the sleeping car companies are taking sides. The recent consolidation of the Big Four with the C. C. C. & I. lines has done away with the use of Pullman cars on the Big Four. The Pullman Co., not to be outdone, has placed four "tip-top" sleeping cars on the route between Cincinnati and Chicago, over the Cincinnati, Hamilton & Dayton, and the Louisville, New Albany & Chicago. These cars are vestibuled and lighted by electricity. The Pennsylvania officers say that in the last three years their passenger business between Chicago and Indianapolis and Louisville has dropped from 75 to 15 per cent., and they claim it is due to the Monon's secret rate-cutting and sale of tickets through scalpers. They will present the case to the Inter-state Commerce Commission.

The Inter-state Commerce Commission.

Hervey-Bates, a miller in Indianapolis, complains against the Pennsylvania Railroad and the Pennsylvania Co. The complainant says that defendants now charge as freight on corn from Indianapolis to New York City 18½ cents per 100 lbs., at the same time charging as freight on ground corn, cracked corn and cornmeal grits and hominy, and the refuse from the manufacture of said cereal, at the rate of 23 cents per 100 lbs., thereby giving a direct and immediate advantage to the miller at the East of 4½ cents per 100 lbs., and placing upon complainant a disadvantage and consequent loss exactly corresponding to the gain of the Eastern competitor.

The American Wire Nail Co., of Covington, Ky., has filed a complaint against the Queen & Crescent Fast Freight Line. The complainant alleges that his company was charged 40c. per 100 lbs. for transporting wire nails packed in kegs from Cincinnati to Chattanooga., Tenn., while only 15c. was charged for transporting iron nails from Cincinnati to Chattanooga, which difference, complainant says, is quite a burdensome discrimination, for the reason of the precise similarity in value and character of the nails.

Hoag & Tichenor have filed a complaint against the New York, Lake Erie & Western, alleging that that company has charged $31.86 for hauling a car load of empty nail kegs weighing 8,850 lbs. from Youngstown, O., to Binghamton, N. Y., while at the same time it offers to transport a carload of nails weighing 24,000 lbs. between the same points and in the same direction for a lesser sum. This, complainants contend, is a manifest and gross injustice, and they ask for redress.

Among the cases assigned for hearing during September by the Commission are the following: At the United States court room, in New York, on Sept. 12, at 11 o'clock, the cases of John Livingston, Campville, N. Y., against the New York, Lake Erie & Western and Wells, Fargo & Co., unjust discrimination; the Poughkeepsie Iron Co. against the Boston & Albany, unjust discrimination; in the matter of Inter-state rates of the Mallory Steamship Line and the Clyde Steamship Line; Hoag & Tichenor, Binghamton, N. Y., against the New York, Lake Erie & Western, classification.

Texas Rates

The Southern Inter-state Association, which comprises all the railroads running into Texas, has reduced rates on all classes of freight. Common point territory has been extended as far west as Albany, Tex., on the Texas Central, Brownville, Tex., on the Gulf, Colorado & Santa Fe, to all points on the Fort Worth & Rio Grande, to Cisco on the Texas Pacific and Gatesville on the Cotton Belt. The new tariff went into effect on Aug. 19, and it makes a reduction of from 8 to 15 per cent.

Instruction in Steam Engineering.

The Young Men's Institute of the Young Men's Christian Association of New York City will begin its evening class in "Theory and Practice of Steam Engineering," at the rooms of the Institute, 222 Bowery, on Wednesday evening, Oct. 2. The class will be taught by Mr. Wm. H. Weightman, M. E., and is intended for firemen, apprentices and engineers. It will be held on Wednesday and Friday evenings until April 30. Those who desire to attend should apply to the Secretary of the Institute, E. C. Baldwin.

Northwestern Rates.

Mr. Faithorn, Commissioner of the Western Freight Association, reported at Chicago Tuesday that the Trunk Lines had refused the application for prorating to St. Paul to the Executive Committee. The Commissioner asked for through rates on the basis of 85 cents first-class New York to St. Paul. The general sentiment among Eastern railroadmen is against getting involved in Northwestern disputes.

Army Transportation Rates.

Second Comptroller Gilkson has rendered a decision in the matter of rates to be allowed bond-aided Pacific railroads for transportation on request of the quartermaster general. He says: "I shall hold that for travel upon requests for through transportation issued by the War Department, credit must be given the railroads on the basis of through limited rates, and in the absence of positive proof produced to me that holders of such requests did stop while on their journey, the burden of proof will be on the railroads to rebut the presumption that the travel was by a continuous journey, and hereafter the accounts and claims for army transportation over the bond-aided roads will be adjusted accordingly."

The Sault Ste. Marie Convention.

The convention of Boards of Trade, State Commissioners and others interested in keeping open the northern routes in competition with the American lines further south, finished its labors at Sault Ste. Marie, Mich., last week. Ex-Congressman Seymour said: "We merely wish to be left alone; to be allowed to do our business in the way that we have done it, allowing the great traffic between the East and the West to pass by its natural channels. The keynote struck here will be the signal for a concert from the Northwest that will prove interesting to Judge Cooley and several of the great Eastern trunk lines." The work accomplished by the convention can be summed up as follows: While some attention was paid to waterways, the principal and engrossing feature was the discussion of international traffic and the Inter-state Commerce law. The Governors of Iowa and Minnesota appointed delegates for those states, thus giving the convention a semi-official character.

Skeleton Tickets.

The Southern Pacific Co. announces that in future it will not accept skeleton tickets to points along its line, and that passengers presenting them will be required to pay full fare. A skeleton ticket having the name of the destination written in by the ticket agent, instead of being printed, is open to the objection that the name of the station may be chemically erased and another and more distant name written in. On a long line like the Southern Pacific such a fraud might be worth perpetrating, because the differences in fares between stations might be large enough to be an object to swindlers.

The Cleveland Car Association.

The members of the Cleveland Car Service Association have agreed upon rules and regulations which will conform substantially to the Chicago Association. The association will become operative Oct. 15. It was agreed that Lake business, owing to the uncertainty of the arrival of vessels, should be exempt from the rules. The charge for cars will be $1 per day after the limit of 48 hours for loading or unloading, or 72 hours on private tracks, has expired. All the local lines at Cleveland will be represented in the Association.

East-Bound Shipments.

East-bound shipments, except live stock, from Chicago last week amounted to 43,775 tons, against 46,372 the previous week, and 44,676 the corresponding week of 1888. Of the above, 16,579 tons were flour, grain and provisions. The Michigan Central took 26 per cent.; Lake Shore and Grand Trunk, each 18; Fort Wayne, 17; New York, Chicago & St. Louis and Baltimore & Ohio, each 8; Chicago, St. Louis & Pittsburgh, 5.

Anthracite Coal Statistics.

Mr. John H. Jones, Chief of Bureau of Anthracite Coal Statistics, publishes the following statement of anthracite coal production for July:

Month of July.	1889. Tons.	1888. Tons.	Inc. or Dec.
From Wyoming region...	2,001,763	1,717,686	I. 284,077
" Lehigh " ...	598,655	705,313	D. 106,657
" Schylkill " ...	1,027,103	943,273	I. 83,830
Total	3,627,522	3,366,272	I. 261,249

Seven months.	1889. Tons.	1888. Tons.	Inc. or Dec.
From Wyoming region...	10,053,468	11,870,849	D. 1,817,381
" Lehigh " ...	3,440,040	2,524,436	I. 915,604
" Schuylkill " ...	5,281,215	5,126,442	I. 154,773
Total.....	18,774,724	19,521,728	D. 747,003

The stock of coal on hand at tide-water shipping points July 31, was 788,069 tons; on June 30, 833,764 tons, decrease, 45,695 tons.